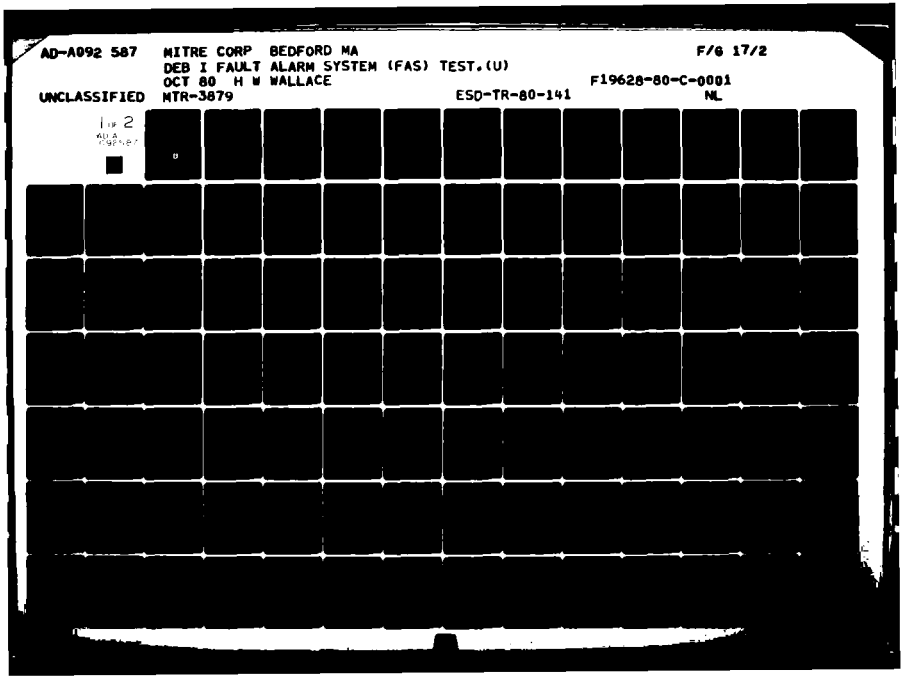
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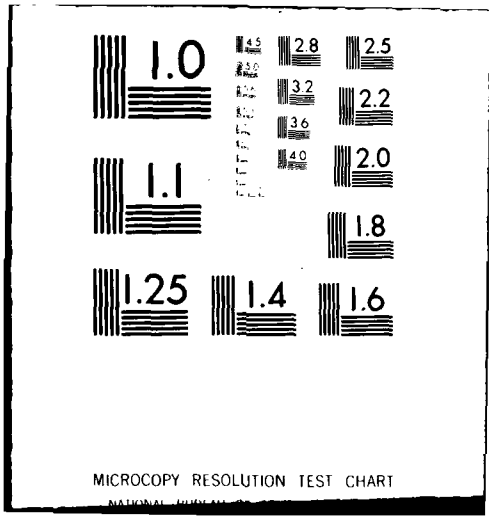
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4.0
4.5
MICROCOPY RESOLUTION TEST CHART

ESD-TR-80-141

MTR-3879

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DEB I FAULT ALARM SYSTEM (FAS) TEST FINAL REPORT

BY HERBERT W. WALLACE

OCTOBER 1980

Prepared for

DEPUTY FOR COMMUNICATIONS AND INFORMATION SYSTEMS
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REVIEW AND APPROVAL

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DIGITAL EUROPEAN BACKBONE I (DEB I)
FAULT ALARM SYSTEM (FAS)
SYSTEM TESTING

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

System Testing of the Digital European Backbone (DEB) I Fault Alarm System (FAS) was accomplished in August-September, 1979. The test verified the operation of three FAS master stations and twelve FAS remote stations (the thirteenth remote station, Vicenza, could not be verified because its installation was incomplete). Numerous problems were found during the course of the test activity. Among these

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20. ABSTRACT (concluded)

were defective printed circuit boards, incorrect strapping, and wiring errors in the FAS equipment and at the IDF. Instances of spontaneous control switching actions were observed. Their cause was found and corrected. Problems that were not readily correctable were identified as open items for future action. All problems found (those corrected and those still open) are identified.

ACKNOWLEDGMENTS

This report has been prepared by The MITRE Corporation under Project No. 4920. The contract is sponsored by the Electronic Systems Division, Air Force Systems Command, Hanscom Air Force Base, Massachusetts.

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

LIST OF ILLUSTRATIONS

LIST OF TABLES

1.0 INTRODUCTION

System testing of the DEB I Fault Alarm System (FAS) was begun on 20 August and completed 5 September 1979. During this time the three FAS master stations were operated together with twelve of the thirteen FAS remote stations. All Alarm, Status, and Control functions were checked for each remote. The FAS remote station at Vicenza (VCA) was not tested because its installation was found to have been incomplete to the extent that the VCA remote was incapable of responding to a poll from the master stations. An installation team has been scheduled to return and correct all wiring deficiencies at Vicenza.

Numerous minor, and some major problems were found during the test effort. Many of these were corrected and the functions were re-tested. Those problems not readily correctable were identified as items for future action. All problems found (those corrected and still open) are addressed herein.

2.0 TEST PROCEDURES AND PLANS

2.1 Procedures

The procedure used in these tests is designated TP-14-01/16-05 "Station/System Checkout of the Fault Alarm System." This procedure incorporates all elements of the separate station (TP-14-01) and system (TP-16-05) procedures which were originally intended to be performed sequentially. Given that the system test is the more stringent of the two, it became the basic procedure whereas the station tests were utilized only as necessary for troubleshooting purposes.

The basic philosophy behind the test procedures, is to test each function appropriate to each remote station, and to verify that each remote is fully capable of interaction with each master station.

The procedures utilized are presented in Appendices A, B, and C as follows: Basic Procedures (Appendix A), Remote Station Troubleshooting Procedure (Appendix B), and Control Function Troubleshooting Procedure (Appendix C).

2.2 Plans

The test effort required that test team members be assigned at the three FAS master stations for the duration of the test. In addition, two roving teams were required for the purpose of observing the remote stations' operation and for troubleshooting as necessary. Two roving teams were utilized so that while one team was testing, the other could be in transit to the next scheduled site. Each team was provided with a proportionate share of the spare parts on hand at the Aviano Field Office. The plan for system testing is presented in Appendix D.

Test Data Forms were provided to the teams at each master station and to the two roving teams. Each team was expected to record pertinent observations on test results. The data forms were adapted from forms provided with the original TP-16-05. The modified forms provided additional information pertinent to the test effort and provided adequate space for notating test results. Sample forms are presented in Appendix E.

The test was completed in approximately two and a half weeks despite considerable delays caused by unexpected problems which required extensive troubleshooting before testing could begin.

3.0 TEST METHODS

3.1 Initial Test Set-Up

One of the three master stations was designated as Primary, while the other two Master Stations acted as Slaves. The "Manual Interrogate" switch for the Remote Station under test was enabled at all three Master Stations. (If the system is operating properly this would cause any alarm, status and control indication visible at the remote under test to be displayed at all three masters.) The displays at all four locations were compared and any instances of different indications were noted and investigated prior to proceeding.

3.2 Testing The Alarm Functions

The Test Data Forms (TP-16-05-3a, b, c, and d) indicate those alarms applicable to the particular site under test. These forms were provided to test personnel at all three masters and the remote. The alarms were tested in sequence at the source, if possible; otherwise at the FAS connection to the IDF. Upon activation of each alarm at the remote, information was conveyed over the orderwire as to the method of activation (energized at the source or at the IDF), and if at the IDF, whether cross-connections to sensor had been installed. Each station then observed the panel indications and entered results on the test data form.

3.3 Testing The Status Indicators

The status indicators on the Master Stations serve to indicate the results of control or switching actions (Rcvr A Operate, Tower Light On, etc.). All status indications appropriate to the remote under test were tested in turn. Their proper operation was verified at the remote station by actually placing the various equipments on-line. The three master stations verified that their status indicators accurately reflected actual conditions. Results were entered on Test Data Forms TP-16-05-4a and 4b.

3.4 Testing The Control Functions

There are two types of control functions: latching and momentary contact. When activated, the latching function's operations are indicated by L.E.D.'s on the remote and master FAS panels. Switching actions at the remote in response to control actions initiated at the master are verifiable by observation of the equipment configuration at the remote.

Momentary contact control functions are also verifiable by observation of the equipment configuration provided the equipment is connected to the FAS. However, there are several functions for which the equipment is not yet connected (TX Norm-Stby, RX Stby-Norm, etc.). These were verified by measuring the resistance at the IDF as the relays were activated. All results were entered on Test Data Forms TP-16-05-5a and 5b.

Even though all latching type relay control functions at a remote site were tested from the primary master, the other two masters were caused to execute at least two latching control functions in order to insure that each master-remote combination was capable of proper operation. The only exceptions were during the times the Coltano Master was being worked on, and during the time the Hohenstadt Master had a defective Control Encoder card. During these times control was exercised by the two functional masters. Later, when Coltano and Hohenstadt came back on-line, they performed control actions with those stations previously missed.

Test Note: Initially the control portion of the procedure was performed according to the step-by-step instructions given in Table IV of the procedure. One of the more annoying of the FAS human factor-type of deficiency soon became apparent. The push-buttons that must be depressed in order to execute a control function are very small in diameter and require that considerable finger pressure be applied. These buttons must be depressed until the appropriate indications are received. Depending upon the site under test, this can take many seconds during which time the pressure of the pushbuttons begins to hurt. The least painful, and therefore, the most practical method of executing a command is as follows:

(1) Place station to be controlled in "MAN INTERR" and keep it there throughout the control action.

(2) Select control action to be performed, using thumbwheels.

(3) Press "CMD INT" and "BRDCST CLR" simultaneously (relay light "ENER" or "DE-EN" will illuminate after a delay).

(4) Keep "CMD INT" depressed, release "BRDCST CLR" and depress "PRESELECT" ("PRESELECT" light will illuminate after a delay).

(5) Keep "CMD INT" depressed, release "PRESELECT" and depress "BRDCST EXEC" ("PRESELECT" light will extinguish after a delay).

This procedure was adopted as standard and was used throughout the remainder of the test.

4.0 PROBLEMS ENCOUNTERED

The test was beset by numerous problems. These are summarized below for the purpose of illustrating the types of obstacles which had to be overcome before the test could be successfully completed.

(1) The initial pre-test checkout of the system showed that five stations; Zugspitze (ZUG), Mt. Paganella (PAG), Mt. Serra (MSA), Vicenza (VCA), and Aviano (AVO) were not answering when polled. Troubleshooting these problems revealed the following discrepancies:

The Aviano Master Station had one station card which was defective and one which had been strapped incorrectly. Correcting these problems brought Aviano on-line and removed one obstacle blocking Vicenza from coming on-line. Mt. Serra was restored to service when it was found that the Mt. Serra "Alarm Disable/Reset" switch had been left in the wrong position. (This switch must be left in "Disable" position at unmanned sites). A defective interface card and an incorrect station code strap were found at Mt. Paganella. At Zugsptize it was found that one back-plane strap was incorrect, the change order necessary for half duplex operation had not been implemented, the interface card was defective, and the transmit level was incorrect.

When all of these problems had been corrected, all remote stations except Vicenza were capable of reporting. Vicenza must be re-visited by an installation team capable and willing to do a complete installation.

(2) The Coltano Master had several problems which required correction before it would operate in "slave" mode. One power module was defective, one decode card was defective, one station card was defective, and a back-plane wiring error was found.

(3) In the entire thirteen-site configuration, there is only one complete T.O. (Preliminary) to the extent that it contains a set of logic flow diagrams. Without access to these diagrams it is practically impossible to troubleshoot any major problems. Most sites have access to schematics of individual modules, but Aviano has the only set of flow diagrams. This meant that during the test all troubleshooting efforts had to be directed from Aviano.

(4) The combined FAS/voice orderwire channel stayed in-service to the extent that it was usable during the entire test, but it has multiple problems which must be addressed before the FAS can operate in a relatively error-free environment. These problems are discussed in Section 6.2.

5.0 TEST RESULTS

Table 5-1 summarizes the results of the FAS system test. The actual test data forms are on file at DET 9, Kapaun A.S. W. Germany. The Alarm Point numbers, Status Point numbers, Control Codes and the matrix entries are defined immediately following the table. A " " matrix entry indicates a fully operational function verified all the way to/from the source. A "1" series entry (1 a through 1 g) indicates that FAS operation was verified at its connection to the IDF. A "2" series entry (2 a through 2 f) represents a function that was not satisfactorily tested. The letter designations provide general information concerning the test results. Table 5-1 follows.

TABLE 5.1 SUMMARY OF THE FAULT ALARM SYSTEM TEST RESULTS

	ALARM POINT NUMBERS																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
VHN	-	-	-	-	1c	-	-	-	-	-	-	-	-	-	-	-	-	-
HST	-	-	-	-	1c	-	-	-	✓	✓	-	-	✓	✓	✓	✓	✓	✓
ZUG	1a	1a	1a	1a	-	1a	1c	1c	1e	✓	✓	1c	✓	✓	✓	✓	✓	✓
CIM	1c	✓	✓	1a	1e	1a	1c	1c	✓	✓	✓	1c	✓	✓	✓	✓	✓	✓
PAG	2c	2c	2c	✓	2e	2c	2c	2c	✓	✓	2e	2c	✓	✓	✓	✓	✓	✓
MCA	1c	2e	1a	1a	1c	1a	1a	1a	✓	✓	✓	1a	✓	✓	✓	✓	✓	✓
MTC	1c	1e	✓	1a	1e	1a	1a	1a	✓	✓	✓	1c	✓	✓	✓	✓	✓	✓
MSA	1a	✓	✓	✓	✓	1b	2d	1c	✓	✓	✓	1a	✓	✓	✓	✓	✓	✓
CLO	—	—	—	—	1c	-	-	-	-	-	1d	-	-	2e	✓	-	✓	✓
MTE	1c	1a	1a	1a	1a	1a	1a	1a	✓	✓	✓	1e	-	✓	✓	-	✓	✓
CEG	1c	✓	✓	1a	1c	1a	1c	1c	✓	✓	✓	1c	-	✓	✓	-	✓	✓
AVO	-	-	-	-	1c	-	-	-	✓	✓	✓	-	-	✓	✓	-	✓	✓
VCA	-	-	-	-	2e	-	-	-	2e	2e	2e	-	-	2e	2e	-	2e	2e

NOTE: Definitions of Table entries and alarm points, status points and control codes follow table

TABLE 5.1 (cont'd)

	ALARM POINT NUMBERS																	
	19	20	21	25	26	27	28	29	30	31	32	37	38	39	40	41	42	43
VLS	-	-	-	-	-	-	-	-	-	-	-	✓	✓	✓	✓	✓	✓	✓
HST	✓	✓	1b	✓	✓	1a	1a	1a	1a	✓	✓	✓	✓	✓	✓	✓	✓	✓
ZUG	✓	✓	1b	✓	✓	1c	1c	1c	1c	1c	1c	✓	✓	✓	✓	✓	✓	✓
CIM	✓	1e	1b	✓	✓	1c	1c	1c	1c	✓	✓	1e	✓	✓	✓	✓	✓	✓
PAG	✓	✓	✓	✓	✓	2c	2c	2c	2c	✓	✓	✓	✓	✓	✓	✓	✓	✓
MCA	✓	✓	1b	✓	✓	1c	1c	1c	1c	✓	✓	✓	✓	✓	✓	✓	✓	✓
MTC	✓	✓	1b	✓	✓	1c	1c	1c	1c	✓	✓	-	✓	✓	-	✓	✓	✓
MSA	✓	✓	1b	✓	✓	1c	1c	1c	1c	✓	✓	-	✓	✓	-	✓	✓	✓
CLO	✓	✓	1b	✓	✓	1a	1a	1a	1a	1b	✓	-	-	-	-	-	-	-
MTL	✓	✓	1b	✓	✓	1c	1c	1c	1c	✓	✓	✓	✓	✓	✓	✓	✓	✓
CLG	✓	✓	1b	✓	✓	1c	1c	1c	1c	✓	✓	✓	✓	✓	✓	✓	✓	✓
AVO	✓	✓	1b	1b	✓	1c	1c	1c	1c	1b	✓	-	-	-	-	-	-	-
VCA	2e	2e	2e	2e	2e	2e	2e	2e	2e	2e	2e	-	-	-	-	-	-	-

TABLE 5.1 (cont'd)

	ALARM POINT NUMBERS																		
	44	45	49	50	51	52	53	54	55	56	61	62	63	63	64	65	66	67	68
VHN	✓	1b	1b	1b	1c	1c	1c	1c	1b	1b	-	-	-	-	-	-	-	-	-
HST	✓	1b	✓	✓	1a	1a	1a	1a	1b	✓	-	-	-	-	-	-	-	-	-
ZUG	✓	1b	✓	✓	1c	1c	1c	1c	✓	✓	-	-	-	-	-	-	-	-	-
CIM	1e	1b	✓	✓	1g	1g	1g	1g	1e	✓	-	-	-	-	-	-	-	-	-
PAG	✓	✓	✓	✓	2c	2c	2c	2c	✓	✓	-	-	-	-	-	-	-	-	-
MCA	✓	1b	✓	✓	1c	1c	1c	1c	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
MTC	✓	1b	✓	✓	1c	1c	1c	1c	✓	✓	-	-	-	-	-	-	-	-	-
MSA	✓	1b	✓	✓	1a	1a	1a	1a	✓	✓	-	-	-	-	-	-	-	-	-
CLO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MTE	✓	1b	✓	✓	1c	1c	1c	1c	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CEG	✓	1b	✓	✓	1c	1c	1c	1c	✓	✓	-	-	-	-	-	-	-	-	-
AVO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VCA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

TABLE 5.1 (cont'd)

	ALARM POINT NUMBERS																		
	69	73	74	75	76	77	78	79	80	85	86	87	88	89	90	91	92	93	
VHN	-	-	-	-	-	-	-	-	-	1b	1b	1b	1b	1b	-	-	-	-	
HST	-	-	-	-	-	-	-	-	-	✔	✔	✔	✔	✔	✔	✔	✔	✔	
ZUG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
CIM	-	-	-	-	-	-	-	-	-	✔	✔	-	-	-	-	-	-	-	
PAG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
MCA	1b	✔	✔	1c	1c	1c	1c	✔	✔	✔	✔	✔	-	-	-	-	-	-	
MTC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
MSA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
CLO	-	-	-	-	-	-	-	-	-	1e	✔	✔	✔	✔	✔	1b	✔	✔	
MTE	1b	✔	✔	1c	1c	1c	✔	✔	✔	✔	✔	✔	-	-	-	-	-	-	
CEG	-	-	-	-	-	-	-	-	-	✔	✔	-	-	-	-	-	-	-	
AVO	-	-	-	-	-	-	-	-	-	✔	✔	✔	✔	✔	-	-	-	-	
VCA	-	-	-	-	-	-	-	-	-	2e	2e	2e	2e	-	-	-	-	-	

TABLE 3.1 (Continued)

	ALARM POINT NUMBERS			STATUS POINT NUMBERS														
	94	95	96	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
VLS	-	-	-	-	-	✓	✓	-	-	-	-	-	-	-	-	-	-	2b
HST	✓	✓	✓	✓	✓	✓	✓	-	-	-	-	-	-	-	-	-	-	2b
ZLC	-	-	-	✓	✓	✓	✓	-	-	✓	✓	✓	✓	-	-	✓	1c	2b
CLM	-	-	-	✓	✓	✓	✓	-	-	✓	✓	✓	2c	-	1c	✓	1c	2b
PAG	-	-	-	✓	✓	✓	✓	-	-	2c	2c	2c	2c	-	2c	✓	1c	2b
MCA	-	-	-	✓	✓	✓	✓	✓	✓	-	-	-	-	-	1c	✓	1c	2b
MTC	-	-	-	✓	✓	✓	✓	-	-	✓	✓	✓	✓	-	1c	✓	1c	✓
HSA	-	-	-	✓	✓	✓	✓	-	-	-	-	-	-	-	-	✓	1c	2b
CLO	-	-	-	✓	✓	-	-	-	-	-	-	-	-	-	-	-	-	2b
MTL	-	-	-	✓	✓	✓	✓	✓	✓	-	-	-	-	-	-	✓	1c	2b
CLG	-	-	-	✓	✓	✓	✓	-	-	-	-	-	-	-	1c	✓	1c	2b
AVO	-	-	-	✓	✓	-	-	-	-	-	-	-	-	-	-	✓	1c	2b
VCA	-	-	-	2c	2c	-	-	-	-	-	-	-	-	-	-	2e	2e	2e

TABLE 5.1 (Continued)

	STATUS POINT NUMBERS											CONTROL CODE NUMBERS						
	25	26	27	28	29	30	31	32	33	34	35	01	02	03	04	05	11	12
VHN	-	-	✓	✓	-	-	-	-	1c	-	-	-	-	✓	✓	-	-	-
HST	✓	✓	✓	✓	-	-	-	-	1c	-	-	✓	✓	✓	✓	-	-	-
ZUG	✓	✓	✓	✓	-	-	-	-	-	-	-	✓	✓	1e	✓	-	-	1e
CIM	✓	✓	✓	✓	-	-	-	-	1a	-	-	✓	✓	✓	✓	-	-	✓
PAG	✓	✓	✓	✓	-	-	-	-	2e	-	-	✓	✓	✓	✓	-	-	2e
MCA	✓	✓	✓	✓	✓	✓	-	-	1c	-	-	✓	✓	✓	✓	✓	✓	-
MTC	✓	✓	✓	✓	-	-	-	-	1c	-	-	✓	✓	✓	✓	-	-	✓
MSA	✓	✓	✓	✓	-	-	-	-	✓	-	-	✓	✓	✓	✓	-	-	-
CLO	✓	✓	-	-	-	-	-	-	1c	-	-	✓	✓	-	-	-	-	-
MIL	✓	✓	✓	✓	✓	✓	-	-	1c	-	-	✓	✓	✓	✓	✓	✓	-
CLG	✓	✓	✓	✓	-	-	-	-	1c	-	-	✓	✓	✓	✓	-	-	-
AVO	✓	✓	-	-	-	-	-	-	1c	-	-	✓	✓	-	-	-	-	-
VCA	2e	2e	-	-	-	-	-	-	2e	-	-	2e	2e	-	-	-	-	-

TABLE 5.1 (Continued)

CONTROL CODE NUMBERS

	13	14	15	21	22	23	24	25	31	32	33	34	35	36	37	38	39	40
VHS	-	-	-	-	-	-	-	2b	-	-	-	-	1b	1b	1b	1b	-	-
HST	-	-	-	-	-	✓	2f	2b	1a	1a	1a	1a	1a	1a	1a	1a	-	-
ZLG	1c	1e	1e	-	-	✓	1c	2b	1c	1c	1c	1c	1c	1c	1c	1c	-	-
CIM	1e	✓	2e	-	1e	✓	1c	2b	1c	1c	1c	1c	1c	1c	1c	1c	-	-
PAG	2e	2e	2e	-	2c	✓	2c	2b	2c	2c	2c	2c	2c	2c	2c	2c	-	-
MCA	-	-	-	-	1c	✓	1c	2b	1a	1a	1g	1g	1a	1a	1a	1a	1a	1a
MTC	✓	✓	✓	-	1c	✓	1c	✓	1a	1a	1a	1a	1a	1a	1f	1a	-	-
MSA	-	-	-	-	-	✓	1c	2b	1c	1b	1c	1b	1c	1b	1c	1b	-	-
CLO	-	-	-	-	-	-	-	2b	1c	1c	1c	1c	-	-	-	-	-	-
MTL	-	-	-	-	1c	✓	1c	2b	1c	1c	1c	1c	1c	1c	1c	1c	1c	1c
CLG	-	-	-	-	1c	✓	1c	2b	1c	1c	1c	1c	1c	1c	1c	1c	-	-
AVO	-	-	-	-	-	✓	1c	2b	1a	1a	1a	1a	-	-	-	-	-	-
VCA	-	-	-	-	-	2e	2e	2e	2e	2e	2e	2e	-	-	-	-	-	-

TABLE 5.1 (Continued)

	CONTROL CODE NUMBERS								
	41	42	43	44	45	46	47	48	49
VAN	-	-	-	-	✓	✓	-	-	-
LST	-	-	✓	✓	✓	✓	-	-	-
ZUG	-	-	✓	✓	✓	✓	-	-	-
CIN	-	-	✓	✓	✓	✓	-	-	-
PAG	-	-	✓	✓	✓	✓	-	-	-
MCA	1a	1a	✓	✓	✓	✓	✓	✓	-
MTC	-	-	✓	✓	✓	✓	-	-	-
MSA	-	-	✓	✓	✓	✓	-	-	-
CLO	-	-	✓	✓	-	-	-	-	-
MTL	1c	1c	✓	✓	✓	✓	✓	✓	-
CEG	-	-	✓	✓	2e	2e	-	-	-
AVO	-	-	✓	✓	-	-	-	-	-
VCA	-	-	2e	2e	-	-	-	-	-

DEFINITIONS OF ENTRIES IN TABLE 5.1

-	=	Not applicable for this site
✓	=	Fully functional. Verified to or from source
1a	=	FAS verified to IDF - cross-connected
1b	=	FAS verified to IDF - not checked at source because of operational traffic
1c	=	FAS verified to IDF - not cross-connected
1d	=	Fully functional, but sensor should be reset
1e	=	FAS verified to IDF - problem with equipment
1f	=	FAS functional, but FAS not terminated at IDF
1g	=	FAS functional, but wired to wrong IDF pins
2a	=	Not tested because of operational traffic
2b	=	Not tested because of difficulty cancelling FAS test - (problem later found in FAS masters and corrected)
2c	=	Not tested - wiring list not available at site
2d	=	Not tested - generator is "on" continuously
2e	=	Not tested - problem with equipment
2f	=	not tested - FAS not terminated at IDF

DEFINITIONS OF ALARM POINT, STATUS
POINT AND CONTROL CODE NUMBERS
AS PRESENTED IN TABLE 5-1

Alarm Point Number	Identification	Purpose
1	Fire	Indicates fire detected by a smoke detector, or a temperature above 135°F.
2	Intruder	Indicates that a door or window has been opened.
3	High temperature	Temperature is greater than 90°F.
4	Low temperature	Temperature is less than 55°F.
5	Tower light	Indicates failure of at least one tower light, or failure of flasher.
6	Pri. A.C. fail	Loss of commercial A.C. power.
7	Gen #1 fail	Gen #1 failed to start either after remote control or automatic attempt.
8	Gen #2 fail	Same as above, for gen #2.
9	Pri. Rect. off	Primary rect. is not delivering power to the station.
10	Stby rect. on	Standby rect. is delivering power to the station.
11	W/G press	Either excessive pressure, or low pressure in waveguide.
12	Fuel low	Indicates less than 72 hours of fuel remaining for the generators.
13	1A TWT	Indicates a drop in the link 1 "A" TWT power output $\geq$ 3db.
14	1A TX	Indicates: (1) a drop in link 1 "A" TX power output $\geq$ 3db, (2) loss of modulation, or (3) TX AFC drift. NOTE: TWT & TX alarms may also be caused through failure of a power supply.
15	1A RX	Indicates failure of the link 1"A" receiver.

Alarm Point Number	Identification	Purpose
16	1 B TWT	Same as above for the link 1 "B" TWT, TX or RX.
17	1 B TX	"
18	1 B RX	"
19	1 RSL Fade	Indicates a drop in received signal level on either the link 1 "A" Rcvr, "B" Rcvr or both.
20	1 Pwr supplies	Indicates failure of at least one of the following pwr supplies: 1 "A" or "B" TWT, 1 "A" or "B" primary pwr; 1 "A" or "B" XMT/RCV power, or "A" or "B" ANC power. NOTE: A TWT failure may also cause a power supply alarm.
21	1 Phase lock	Loss of phase lock on either or both of the link 1 receivers.
25	1 TDM major	Failure of (1) both TDM transmitters, (2) both TDM receivers, or (3) TDM power supply.
26	1 TDM minor	Failure of one TDM transmitter and/or one TDM receiver.
27	1 TX Stby oper	The TDM is operating on the standby transmitter for link 1. NOTE: Alm not yet operational. Installation awaiting eqpt. mod.
28	1 RX Stby oper	The TDM is operating on the standby receiver for link 1. NOTE: Alm not yet operational. Installation awaiting eqpt. mod.
29	1 Norm T1 fault	Indicates loss of one or more T1 lines on link 1 norm TDM RX. NOTE: Alm not yet operational. Installation awaiting eqpt. mod.
30	1 Stby T1 fault	Indicates loss of one or more T1 lines on link 1 stby TDM RX.

Alarm Point Number	Identification	Purpose
		NOTE: Alm not yet operational. Installation awaiting eqpt. mod.
31	1 Norm errors	Indicates high error rate on link 1 normal TDM receiver (> 1 error in 100,000).
32	1 stby errors	Indicates high error rate on link 1 standby TDM receiver (> 1 error in 100,000).
37	2 A TWT	Same as Alm Pt 13 for link 2
38	2 A TX	" " " " 14 " " "
39	2 A RX	" " " " 15 " " "
40	2 B TWT	" " " " 16 " " "
41	2 B TX	" " " " 17 " " "
42	2 B RX	" " " " 18 " " "
43	2 RSL Fade	" " " " 19 " " "
44	2 Pwr supplies	" " " " 20 " " "
45	2 Phase lock	" " " " 21 " " "
49	2 TDM major	Same as Alm Pt 25 for link 2
50	2 TDM minor	" " " " 26 " " "
51	2 TX stby oper	" " " " 27 " " "
52	2 RX stby oper	" " " " 28 " " "
53	2 Norm T1 fault	" " " " 29 " " "
54	2 Stby T1 fault	" " " " 30 " " "
55	2 Norm errors	" " " " 31 " " "
56	2 Stby errors	" " " " 32 " " "
61	3 A TWT	Same as Alm Pt 13 for link 3
62	3 A TX	" " " " 14 " " "
63	3 A RX	" " " " 15 " " "
64	3 B TWT	" " " " 16 " " "
65	3 B TX	" " " " 17 " " "
66	3 B RX	" " " " 18 " " "
67	3 RSL Fade	" " " " 19 " " "
68	3 Pwr supplies	" " " " 20 " " "
69	3 Phase lock	" " " " 21 " " "
73	3 TDM major	Same as Alm Pt 25 for link 3
74	3 TDM minor	" " " " 26 " " "
75	3 TX stby oper	" " " " 27 " " "
76	3 RX stby oper	" " " " 28 " " "
77	3 Norm T1 fault	" " " " 29 " " "
78	3 stby T1 fault	" " " " 30 " " "
79	3 Norm errors	" " " " 31 " " "
80	3 Stby errors	" " " " 32 " " "

Alarm Point Number	Identification	Purpose
85	PCM 1	Indicates failure of a CY-104. (Local and remote alarms are internally combined, so CY-104 must be checked to determine whether alarm is for local or remote failure)
86	PCM 2	Same as Alm Pt 85 for PCM 2
87	PCM 3	" " " " " " " 3
88	PCM 4	" " " " " " " 4
89	PCM 5	" " " " " " " 5
90	PCM 6	" " " " " " " 6
91	PCM 7	" " " " " " " 7
92	PCM 8	" " " " " " " 8
93	PCM 9	" " " " " " " 9
94	PCM 10	" " " " " " " 10
95	PCM 11	" " " " " " " 11
96	PCM 12	" " " " " " " 12

See following pages for definitions of status points and control codes.

Status Point Number	Identification	Purpose
1	1 select RX A	Indicates that receiver "A" on link 1 has been selected and latched on line.
2	1 select RX B	Indicates that receiver "B" on link 1 has been selected and latched on line.
3	2 select RX A	Same as above for link 2.
4	2 select RX B	" " " " " "
5	3 select RX A	Same as above for link 3.
6	3 select RX B	" " " " " "
7	1 TCVR A disable	Indicates that the link 1 "A" transmitter and receiver have been turned off by a master station.
8	1 TCVR B disable	Indicates that the link 1 "B" transmitter and receiver have been turned off by a master station.
9	2 TCVR A disable	Same as Stat Pt 7 for link 2.
10	2 TCVR B disable	" " " " 8 " " "
11	Gen. start	Indicates that the remote generator start control has been activated. NOTE: Not currently in use.
12	TWR lt disable	Indicates that the tower light has been turned off.
13	Load share	Indicates that the rect. load share control has been activated.
14	Future	Latching relay not currently in use.
15	FAS test	FAS test has been activated.
25	1 RX A oper	Indicates that the link 1 RCVR "A" is on-line.
26	1 RX B oper	Indicates that the link 1 RCVR "B" is on-line.
27	2 RX A oper	Same as Stat Pt 25 for link 2.
28	2 RX B oper	" " " " 26 " " "
29	3 RX A oper	Same as Stat Pt 25 for link 3.
30	3 RX B oper	" " " " 26 " " "

Status Point Number	Identification	Purpose
31	Gen #1 on	Generator #1 is on-line.
		NOTE: Not currently in use.
32	Gen #2 on	Generator #2 is on-line.
		NOTE: Not currently in use.
33	Tower lt on	Tower lights are on.
34	Pump #1 on	Fuel pump to gen #1 is on.
		NOTE: Not currently in use.
35	Pump #2 on	Fuel pump to gen #2 is on.
		NOTE: Not currently in use.

See following pages for definitions of control codes.

Control Code	Identification	Purpose
01	1 select RX A	Selects link 1 RCVR "A" and latches it on-line.
02	1 select RX B	Selects link 1 RCVR "B" and latches it on-line. NOTE: The "select" control for one RCVR should be cleared before the other is activated.
03	2 select RX A	Same as 01 for link 2.
04	2 select RX B	" " 02 " " "
05	3 select RX A	Same as 01 for link 3.
11	3 select RX B	" " 02 " " "
12	1 TCVR A disable	Turns off the link 1 "A" receiver and "A" transmitter.
13	1 TCVR B disable	Turns off the link 1 "B" receiver and "B" transmitter.
14	2 TCVR A disable	Same as 12 for link 2.
15	2 TCVR B disable	" " 13 " " "
21	Gen start	Used for testing the generator system by turning off comercial power. NOTE: Not currently in use.
22	Tower lt disable	Turns tower light off when activated.
23	Load share	Places the standby rect. on-line, in parallel with the primary to provide greater charging capacity.
24	Future	Latching relay not currently in use.
25	FAS test	Tests the FAS alarm indicators by inverting all alarm indications (on lamps are turned off, off lamps are turned on).
31	1 TX norm - stby	Transfers link 1 primary TDM TX to standby. This function is not currently operational.
32	1 TX stby - norm	Transfer link 1 standby TDM TX to primary. This funciton is currently in use only at Mt Serra.

Control Code	Identification	Purpose
33	1 RX norm - stby	Transfers link 1 primary TDM RX to standby. This function is not currently operational.
34	1 RX stby - norm	Transfers link 1 standby TDM RX to primary. This function is currently in use only at Mt Serra.
35	2 TX norm -stby	Same as 31 for link 2.
36	2 TX stby - norm	" " 32 " " "
37	2 RX norm - stby	" " 33 " " "
38	2 RX stby - norm	" " 34 " " "
39	3 TX norm - stby	Same as 31, 32, 33 & 34 for link 3
40	3 TX stby - norm	except that these functions are
41	3 RX norm - stby	currently not in use at any
42	3 RX stby - norm	site.
43	1 select TX A	Places the link 1 "A" transmitter on-line if "B" transmitter was previously on-line.
44	1 select TX B	Places the link 1 "B" transmitter on-line if "A" transmitter was previously on-line.
45	2 select TX A	Same as 43 for link 2.
46	2 select TX B	" " 44 " " "
47	3 select TX A	Same as 43 for link 3.
48	3 select TX B	" " 44 " " "
49	Gen reset	Resets the automatic start function to allow 3 additional attempts at starting. NOTE: Not currently in use.

The summary information in Table 5-1 is supported by the following discussions of results for each site.

5.1 Vaihingen (VHN)

5.1.1 Problems Found And Corrected

No problems requiring corrective action were found at Vaihingen.

5.1.2 Problems Found But Not Corrected

5.1.2.1 Function tested at IDF, but not cross-connected.

Alarm Points 5, 51, 52, 53, 54, status point 33.

5.1.3 Additional Information On Problems Not Corrected

None

5.1.4 Functions Not Tested During Test Period

5.1.4.1 FAS Test (Status Point 15 and Control Code 25)

The Aviano Master performed the "FAS test" control function on the first site scheduled for system testing (Paganella). The test was successfully activated, but a problem in the Aviano Master prevented it from cancelling the test. The symptoms were that the Master (after the matrix of LED's was illuminated) was unable to transmit subsequent commands. The only solution found during the test period was to disable most of the decoder cards. This reduced the load on the FAS Master Power Modules and permitted the master to transmit the "disable FAS test" command.

"FAS test" was also tried from the Coltano Master with the same results. It was tried from the Hohenstadt Master and no problems were encountered. Due to uncertainty over the nature of the problem, and due to the procedure necessary to permit cancelling the "FAS test" (if not properly done blown fuses could result) it was decided not to perform the "FAS Test" Control function except from Hohenstadt and then only occasionally.

After the system tests had been completed the Aviano master was investigated and was found to have had two incorrect straps on the S/R card. The same was found at Coltano. Hohenstadt was checked and the S/R straps were found to be correct. The straps were changed and "FAS test" was attempted from both Aviano and Coltano. It was successfully completed from both masters, except with

Vaihingen. A problem exists in the VHN unit and it has not been found as of this writing.

5.1.5 Miscellaneous

5.1.5.1 FAS Tested ok, not Tested at Source Because of Operational Traffic

Alarm Points 45, 49, 50, 55, 56, 85, 86, 87, 88, 89

Control Codes 35, 36, 37, 38

5.2 Hohenstadt (Remote) (HST)

5.2.1 Problems Found And Corrected

5.2.1.1 Initial tests on Alarm Point 20 (1 Pwr Supplies) showed a failure to alarm on power supply "B". A broken wire was found at J21. The retest was ok.

5.2.2 Problems Found But Not Corrected

5.2.2.1 Functions tested at IDF, not cross connected.

Alarm point 5, Status Point 33.

5.2.2.2 Tested at IDF, cross-connected, could not test source.

Alarm Points 27, 28, 29, 30, 51, 52, 53, 54

Control Codes 31, 32, 33, 34, 35, 36, 37, 38

5.2.3 Additional Information On Problems Not Corrected

None

5.2.4 Functions Not Tested During Test Period

5.2.4.1 FAS test (Status Point 15 and Control Code 25)

See Section 5.1.4.1

5.2.4.2 Future (Control Code 24)

This function was not connected between the FAS and the IDF

5.2.5 Miscellaneous

5.2.5.1 FAS tested ok, not tested at source because of operational traffic.

Alarm Points 21, 45, 55

5.3 Zugspitze (ZUG)

5.3.1 Problems Found And Corrected

5.3.1.1 The FAS transmit level at ZUG was incorrect.

5.3.1.2 The change order for half duplex operation had not been installed.

5.3.1.3 In installing the change order an existing strap was found to be incorrect.

5.3.1.4 The interface card was defective

5.3.1.5 Control Code 43 (1 Select Tx A) was not working. Wiring was found shorted at the IDF

5.3.1.6 Back plane wiring strap 2J1-22 to 2J2-22 was missing.

5.3.2 Problems Found But Not Corrected

5.3.2.1 Function tested at IDF, not cross-connected

Alarm Points 7, 8, 12, 27, 28, 29, 30, 51, 52, 53, 54

Status Point 14, Control Codes 24, 31, 32, 33, 34, 35, 36, 37, 38

5.3.2.2 Tested at IDF, cross-connected, could not test source.

Alarm Points 1, 2, 3, 4, 6, 31, 32

Control Codes 03, 12, 13, 14, 15

5.3.3 Additional Information On Problems Not Corrected

5.3.3.1 Alarm Points 31 and 32

Indications could not be obtained from the source.

5.3.3.2 Control Code 03

The problem appears to be in the AGC Monitor wiring.

5.3.3.3 Control Codes 12, 13, 14 and 15

The controls did not cause the equipment to switch.

5.3.3.4 IDF Wiring

Wiring on pins 214, 215 and 216 should be redone.

5.3.4 Functions Not Tested During Test Period

5.3.4.1 FAS Test (Status Point 15 and Control Code 25).

See Section 5.1.4.1

5.3.5 Miscellaneous

5.3.5.1 FAS tested ok, but not tested at source because of operational traffic.

Alarm Points 21, 45

5.3.5.2 FAS tested ok, cross-connected, not wired to source.

Alarm Point 9

5.4 Cima Gallina (CIM)

5.4.1 Problems Found And Corrected

None

5.4.2 Problems Found But Not Corrected

5.4.2.1 Function tested at IDF, not cross-connected

Alarm Points 1, 7, 8, 12, 27, 28, 29, 30

Status Point 14, Control Codes 24, 31, 32, 33, 34, 35,36,37,38

5.4.2.2 Tested at IDF, cross connected, could not test source

Alarm Point 4, 5, 6, 20, 37, 44, 51, 52, 53, 54, 55

Status Points 12, 33, Control Codes 13, 22

5.4.3 Additional Information On Problems Not Corrected

5.4.3.1 Alarm Point 20

Indication received only from B TWT power supply.

5.4.3.2 Alarm Point 44

No indication received from either source

5.4.3.3 Alarm Points 51, 52, 53, 54

Wiring from FAS to IDF is incorrect. The wire on pin 53 should be on pin 51. The wire on pin 54 should be on pin 52. The wire on pin 51 should be on pin 53. The wire on pin 52 should be on pin 54.

5.4.3.4 The baseband levels from PAG receivers are unstable. Suspected source of the problem is either the S/L/S or the receive baseband cabling including the BNC connectors.

5.4.3.5 Status Point 12 and Control Code 22

The tower light disable control appears to be working through the FAS, but operation could not be verified. Function is either miswired at the IDF or not connected to source.

5.4.4 Functions Not Tested During Test Period

5.4.4.1 FAS test (Status Point 15 and Control Code 25)

See Section 5.1.4.1

5.4.4.2 2 TCVR B disable (Status Point 10 and Control Code 15)

This function not tested because only one TCVR was on line.

5.4.5 Miscellaneous

5.4.5.1 FAS tested ok, but not tested at source because of operational traffic

Alarm Points 21, 45

5.5 Paganella (PAG)

5.5.1 Problems Found And Corrected

Extensive troubleshooting had to be accomplished before PAG could be made to respond to polling. Two problems were discovered; a defective interface card and an incorrect station code strap at PAG.

5.5.2 Problems Found But Not Corrected

5.5.2.1 "TCVR A DISABLE", "TCVR B DISABLE"

(Status Points 7, 8, 9, 10 and Control Codes 12, 13, 14, 15.) The FAS appeared to function properly but the control relays did not operate.

5.5.3 Additional Information On Problems Not Corrected

None

5.5.4 Functions Not Tested During Test Period

5.5.4.1 Not tested at IDF (no wiring diagrams)

There were numerous instances where functions which could not be tested at the source also could not be tested at the IDF. The difficulty lay in the fact that a wiring list showing FAS connections to the IDF was not available on-site. The following is a list of those functions not tested either at the source or at the IDF:

Alarm Points 1, 2, 3, 6, 7, 8, 12, 27, 28, 29, 30, 51, 52, 53, 54.

Status Points 14, 33 Control Codes 24, 31, 32, 33, 34, 35, 36, 37, 38

5.5.4.2 FAS test (Status Point 15 and Control Code 25)

See Section 5.1.4.1

5.5.4.3 "Tower light" (Alarm Point 5), "tower light on" (Status Point 33). These functions could not be tested all the way to the source because the installation ended up with a 110 V socket on a 220 V system. They were not checked at the IDF because no wiring list was available.

5.5.5 Miscellaneous

No Items

5.6 Mt. Corna (MCA)

5.6.1 Problems Found And Corrected

There were no problems found that were readily correctable by the test team.

5.6.2 Problems Found But Not Corrected

5.6.2.1 Function tested at IDF, not cross-connected.

Alarm Points 1, 5, 27, 28, 29, 30, 51, 52, 53, 54, 75, 76, 77, 78.

Status Points 12, 14, 33.

Control Codes 22, 24.

5.6.2.2 Tested at IDF, cross-connected, could not test source

Alarm Points 3, 4, 6, 7, 8, 12.

Control Codes 31, 32, 35, 36, 37, 38, 39, 40, 41, 42

5.6.2.3 FAS connected to wrong IDF pins

Control Codes 33, 34

5.6.3 Additional Information On Problems Not Corrected

None

5.6.4 Function Not Tested During Test Period

5.6.4.1 "Intruder" (Alarm Point 2)

This alarm is defeated at the alarm panel.

5.6.4.2 "FAS test" (Status Point 15 and Control Code 25)

See Section 5.1.4.1

5.6.5 Miscellaneous

5.6.5.1 FAS tested ok, not tested at source because of operational traffic

Alarm Points 21, 45, 69.

5.7 Mt. Cimone (MTC)

5.7.1 Problems Found And Corrected

None

5.7.2 Problems Found But Not Corrected

5.7.2.1 Functions tested at IDF, not cross-connected.

Alarm Points 1, 12, 27, 28, 29, 30, 51, 52, 53, 54

Status Points 14, 33

Control Code 24

5.7.2.2 Tested at IDF, cross-connected, could not test source.

Alarm Point 2, 4, 5, 6, 7, 8

Status Point 12

Control Codes 22, 32, 33, 34, 35, 36, 38

5.7.2.3 FAS not connected to IDF

Control Code 37

5.7.3 Additional Information On Problems Not Corrected

5.7.3.1 "Intruder" (Alarm Point 2)

One or more of the intruder alarm contacts is apparently not working properly.

5.7.3.2 "2 RX-NORM-STBY" (Control Code 37)

FAS-to-IDF wiring is not installed.

5.7.3.3. "2" TCVR A disable" (Control Code 14)

In performing this test it was noted that the radio AFC alarm bulb was not operational.

5.7.3.4 All tower light alarm, status and control functions. At the time the FAS system tests were being performed, the MTC tower was being modified and all tower light functions were made inoperable. Upon completion of the MTC tower work these functions should be retested.

5.7.4 Functions Not Tested

None

5.7.5 Miscellaneous

5.7.5.1 FAS tested ok, not tested at source because of operational traffic.

Alarm Points 21, 45

5.8 Mt. Serra (MSA)

5.8.1 Problems Found And Corrected

5.8.1.1 Control command activated on "Preselect"

In performing tests of the Control function we found that in executing the command "Future" (Control Code 24) the relay was activated by the "Preselect" command instead of waiting for "Execute." This was observed when control was exercised from Aviano and from Hohenstadt. The cause was found to be a defective CD5 (Control Decoder 5) at MSA. The card was replaced and the symptom disappeared.

5.8.1.2 Spontaneous Control Actions

Initiating control actions at Mt.Serra from both Aviano and from Hohenstadt occasionally resulted in activating multiple relays simultaneously. Sometimes all relays controlled by a single CD5 (Control Decoder 5) would operate. Sometimes, if relay of a particular number in a particular CD5 was commanded, all relays with the same number in all CD5's would operate.

The problem was found to be a defective interface card at MSA. Replacement of the defective card was followed by an extensive check of all control functions from all master stations without a single recurrence of the problem.

5.8.2 Problems Found But Not Corrected

5.8.2.1 Function tested at IDF, not cross-connected.

Alarm Points 8, 27, 28, 29, 30. Status Point 14, Control Codes 24, 31, 33, 35, 37

5.8.2.2 Tested at IDF, cross-connected, could not test source.

Alarm Point 1, 12, 51, 52, 53, 54

5.8.2.3 "Gen #1 fail" (Alarm Point 7)

This alarm was "on" continuously. There was insufficient time available to locate and correct the cause.

5.8.3 Additional Information On Problems Not Corrected

None

5.8.4 Functions Not Tested During Test Period

5.8.4.1 "FAS test" (Status Point 15 and Control Code 25)

See Section 5.1.4.1

5.8.5 Miscellaneous

5.8.5.1 FAS tested ok, not tested at source because of operational traffic.

Alarm Points 6, 21, 45, Control Codes 32, 36, 38

5.9 Coltano (Remote) (CLO)

5.9.1 Problems Found And Corrected

None

5.9.2 Problems Found But Not Corrected

5.9.2.1 Function tested at IDF, not cross-connected

Alarm Point 5, Status Point 33, Control Codes 31, 32, 33, 34.

5.9.2.2 Tested at IDF, cross-connected, could not test source.

Alarm points 27, 28, 29, 30, 85

5.9.3 Additional Information On Problem Not Corrected

5.9.3.1 PCM 1 (Alarm Point 85)

There appears to be a problem with the operation of the PCM alarm.

5.9.4 Functions Not Tested During Test Period

5.9.4.1 "1 A TX" (Alarm Point 14)

An alarm indication could not be induced at the source. The sensor apparently needs adjustments.

5.9.4.2 FAS test (Status Point 15 and Control Code 25)

See Section 5.1.4.1

5.9.5 Miscellaneous

5.9.5.1 FAS tested ok, not tested at source because of Operational traffic.

Alarm Points 21, 31, 91

5.9.5.2 Waveguide pressue (Alarm Point 11)

This function finally tested ok after an undue wait for the sensor to activate. The sensor needs readjustment.

5.10 Mt. Venda (MTE)

5.10.1 Problems Found And Corrected

5.10.1.1 "Fuel low" (Alarm Point 12)

The FAS was strapped for normally closed contacts. This was restrapped for normally open contacts. Also one of the leads was shorted to ground at the IDF. After these corrections were made, the FAS was observed operational at the IDF. This function has not yet been checked through to the source.

5.10.1.2 "1 A RX" (Alarm Point 15) and "1 B RX" (Alarm Point 18). These receivers had their squelch circuits disabled. the short was removed and the alarms tested ok.

5.10.1.3 "1 Select Tx A" and "1 select Tx B" (Control Codes 43 and 44). The leads for these functions were reversed at the IDF. After restoring the leads to normal, the functions worked ok.

5.10.2 Problems Found But Not Corrected

5.10.2.1 Function tested at IDF, not cross-connected.

Alarm Points 1, 27, 28, 29, 30, 51, 52, 53, 54, 75, 76, 77, 78. Status Points 14, 33. Control Codes 22, 24, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42.

5.10.2.2 Tested at IDF, cross-connected, could not test source.

Alarm Points 2, 3, 4, 5, 6, 7, 8.

5.10.3 Additional Information On Problems Not Corrected

None

5.10.4 Functions Not Tested During Test Period

5.10.4.1 FAS test (Status Point 15 and Control Code 25)

See Section 5.1.4.1

5.10.5 Miscellaneous

5.10.5.1 FAS tested ok, not tested at source because of Operational traffic.

Alarm Points 21, 45, 69.

5.11 Ceggia (CEG)

5.11.1 Problems Found And Corrected

5.11.1.1 PRI A.C. Fail (Alarm Point 6)

This function had been strapped for normally closed contacts. It should have been normally open. The option was changed and the function tested ok at the IDF. The sensor must still be changed to normally open.

5.11.2 Problems Found But Not Corrected

5.11.2.1 Function tested at IDF, not cross-connected.

Alarm Points 1, 5, 7, 8, 12, 27, 28, 29, 30, 51, 52, 53, 54. Status Points 12, 14, 33. Control Codes 22, 24, 31, 32, 33, 34, 35, 36, 37, 38

5.11.2.2 Tested at IDF, cross-connected, could not test source.

Alarm Points 4, 6.

5.11.3 Additional Information On Problems Not Corrected

None

5.11.4 Functions Not Tested During Test Period

5.11.4.1 "FAS test" (Status Point 15 and Control Code 25)

See Section 5.1.4.1

5.11.4.1 "2 Select Tx A" and "2 Select Tx B" (Control Codes 5 and 46)

These were not tested because Tx B is inoperative and a disruption in traffic could have resulted

5.11.5 Miscellaneous

5.11.5.1 FAS tested ok. Not tested at source because of Operational traffic.

Alarm Points, 21, 45.

5.12 Aviano (Remote) (AVO)

5.12.1 Problems Found And Corrected

None

5.12.2 Problems Found But Not Corrected

5.12.2.1 Function tested at IDF, not cross-connected.

Alarm Points 5, 27, 28, 29, 30.

Status Points 14, 33. Control Code 24

5.12.2.2 Tested at IDF, cross-connected, could not test source.

Control Codes 31, 32, 33, 34.

5.12.3 Additional Information On Problems Not Corrected

None

5.12.4 Functions Not Tested

5.12.4.1 FAS test (Status Point 15 and Control Code 25)

See Section 5.1.4.1

5.12.5 Miscellaneous

5.12.5.1 FAS tested ok, not tested at source because of Operational traffic.

Alarm Points 21, 25, 31.

5.13 Vicenza (VCA)

The first step in testing a remote station is to verify that the remote responds to the Master when polled. All attempts in this regard were fruitless with the Vicenza remote. Trouble- shooting the problem revealed that the transmit/receive wiring was not properly installed. The test team ran temporary transmit/receive wires in an attempt to proceed with the test. The unit still failed to respond to the master.

Troubleshooting continued for the rest of the day, during which time strapping options, back-plane wiring, IDF connections, etc. were checked. The following additional discrepancies were found:

1. EIA Interface wiring had not been installed.

2. IDF Connections had been made, but the ground straps (at the IDF) were missing.

With these many known problems, it was decided to cancel further test efforts until the discrepancies at Vicenza are corrected. A recommendation was submitted to the effect that the installation team return to VCA, complete the installation, and remain on-site until the Vicenza system test is completed. This will impose no particular hardship since the estimated test completion time is 1/2 day (provided the installation will have been accomplished completely and correctly).

6.0 COMMENTS ON RESULTS

6.1 General

Given that this was the first time the FAS was subjected to a complete system test, it performed reasonably well. Table 5.1 shows a 12-site total of 920 functions that were to be tested. Results show that at the completion of the test, the FAS satisfactorily performed 853 of these functions. There were numerous functions, mostly of the house-keeping type (intruder, fire, temperature, fuel, etc.) which could not be tested at the source for various reasons (sensor not installed, not cross-connected, etc.), but FAS operation for these functions was verified. Twenty-two of the 67 functions not tested were related to the problems encountered in performing the "FAS test" function. (See Section 5.1.4.1.) Many of the remaining functions not tested were due to the lack of a wiring list at Paganella, such that the team could not locate the proper IDF pins for testing at the IDF.

The net result is that approximately 95% of the FAS functions tested ok and the expectation is that the majority of those functions not tested will also prove to operate satisfactorily when conditions permit them to be tested.

6.2 FAS/Voice Orderwire

The basic problem with the FAS orderwire is the manner in which it has been engineered to share the a frequency spectrum with the voice orderwire for DEB I. In an arrangement such as this, adequate filtering and levels discipline are of utmost importance. A great deal of the problem is caused by site personnel who are accustomed to having to shout over an orderwire. These people continue to shout even when its not necessary. As long as this situation exists, these people will over-modulate and cause errors in the FAS even if levels are properly set.

Other orderwire problems include:

1. The Mt. Cimone keyset injects noise into the orderwire.

2. The 3821 Hz audio channel unit signalling relays must be unplugged in order to avoid voice-activation of signalling tone. The signalling tone is objectionable to the talker and also causes FAS errors.

3. Some stations are unable to call all of the others (probably due to the configuration of the Mt. Corna tandem).

The ultimate solution to the FAS/Voice orderwire problem is to re-engineer the FAS and voice orderwire.

6.3 Spontaneous Control Switching

For a long time it had been recognized that a problem existed in the design of the FAS remotes wherein upon being turned on, the latching relays would assume a random configuration with some relays latched "on" and others latched "off". In addition, it had been suspected that unwanted switching actions, (cause unknown) were also occurring. During the entire test period, the team kept watching for evidence of any spontaneous switching actions whatsoever. The problem with the latching relays activating upon applying power to remotes was observed several times, but tests of the first eleven remotes revealed no instances of spontaneous control actions.

Tests of the Mt. Serra remote (the last one to be tested) finally produced what we had been looking for. It started with an attempt to energize the function labeled "Future" (Control Code 24). The relay associated with this function was activated upon initiating the "pre-select" command instead of waiting for the "execute" command. These results were observed when Mt. Serra was being controlled by Aviano and by Hohenstadt. The CD5 card was placed in a different slot and the command associated with relay number 4 in the new slot (Control Code 04) was initiated, with the same results. The CD5 was replaced and all control functions were retested in order to verify that the problem had been cleared.

Control function "1 select RxA" was initiated. When the execute command was sent, it was noticed that the functions associated with relay number 1 in all three CD5s were activated. These were "1 select RxA", "3 select RxB" and "Gen start". All three relays were reset, the results were noted and we began troubleshooting in an attempt to further characterize the problem. The same phenomenon was observed when control function "1 select RxB" was commanded. The number 2 relays for all three CD5s were energized. These were "1 select RxB", "1 TCVR A Disable" and "Tower Light disable".

"2 select RxA" was then energized and all relays on the first CD5 (1 select RxA, 1 select RxB, 2 select RxA, 2 select RxB and 3 select RxA) were activated. The problem was found to be a defective interface card. The card was replaced and all control functions at Mt. Serra were activated from all three masters. There were no further indications of trouble.

6.4 Scope of Test Effort

Table 5-1 has an eight page attachment entitled, "Definitions of Alarm Point, Status Point, and Control Code Numbers as presented in Table 5-1".

These pages show the identification and purpose of the various FAS functions. The "purpose" column is included for information only. Its inclusion does not in any way imply that the FAS system test verified the alarm thresholds indicated therein. The scope of the FAS test was merely to verify that activation of a sensor would cause a FAS alarm indication. Many, but not all, of the alarm thresholds were set and verified during DEB station tests. Others, such as "fuel low" (72 hours of fuel remaining) are virtually impossible to verify.

7.0 CONCLUSIONS

All who participated in this test effort acquired a greater appreciation for the utility of the FAS. Almost 100% of the DEB equipment alarm, status and control functions are now verified operational from the source. Since completion of the system test, the FAS has been used successfully as a troubleshooting (fault isolation) tool by personnel at Aviano and at Hohenstadt. Now that all known problems with the FAS equipment have been cleared (with the exception of the VCA remote) there is no reason for it not to remain on-line, and provide relatively trouble-free performance.

The "housekeeping" functions (intruder, temprature, tower light, etc.) constitute the major portion of those functions not tested all the way to the source. This should be of relatively little concern until such time as the sites go unmanned. The operation of these functions to/from the source should be re-tested and verified at that time.

APPENDIX A

TP 14-01/16-05

STATION/SYSTEM CHECKOUT OF THE FAULT ALARM SYSTEM (FAS)

Objective

This procedure is used to verify operation of the Fault Alarm System (FAS). The procedure assumes that all interconnects and wiring from associated equipment are complete, and that the radio link(s) are up and working. Accomplishment of this test will require test personnel to be simultaneously positioned at each master and each remote station.

Specifications

Correct operation of display indicators and control functions at remote and master stations.

Test Equipment

Test leads for applying system ground to remote station terminals (20 inches or longer).

Special Considerations

NOTE

DO NOT PLUG OR UNPLUG PRINTED CIRCUIT BOARD ASSEMBLIES WITH POWER APPLIED TO THE EQUIPMENT SHELF. REMOVING FUSE F2 FROM THE POWER MODULE EFFECTIVELY REMOVES POWER FROM ALL CIRCUITS ON THAT SHELF. REFER TO THE REFERENCED PULSE COM MANUALS FOR FURTHER CAUTIONARY NOTES.

Due to the number of stations involved and the numerous control functions and status indicators to be tested, valid comprehensive test results will be achieved only from a carefully organized and controlled test sequence. To accomplish this, a lead test team should be established having overall responsibility for directing and controlling the test sequence. Each participating site must monitor the testing progress continuously and report all alarm/control function observations whether intentional or incidental to testing. All observations must be accounted for, demonstrated to be valid, and accurately documented.

The performance of this test will require that the link orderwire be fully dedicated to test support with the Mt. Corna interconnect enabled. It is essential that this interconnect remain enabled throughout the duration of this test.

Insure that correct station code strapping options have been made at all stations. (Ref E&I standards).

All station cards should be in normal operation unless a remote station is not working. In this case, the station card for that remote should be in the disable position.

Reference

Equipment Instruction Manual Pulsecom Datalok 10 Master Station Polling System, IN #612.

Equipment Instruction Manual Pulsecom Datalok 10 Remote Station

Polling System, IN #611.

E&I Standards.

Procedures

NOTE

PRIOR TO STARTING THIS TEST, TEST PERSONNEL SHOULD LOCATE ALL TEST POINTS AND INDICATORS WHICH WILL BE USED DURING THE CHECKOUT OF FAS EQUIPMENT. INDIVIDUAL DATA FORMS INDICATE WHICH ALARM AND CONTROL FUNCTIONS ARE APPLICABLE TO EACH REMOTE STATION.

1. General

This procedure has been subdivided into four sections: Station Indicators, System Alarms, System Status Indicators, and System Control Functions. The first section is performed to verify preliminary equipment indications and document any valid fault indications prior to the start of actual system testing. The remaining sections will verify correct operation of the Fault Alarm System. Overall conduct of the test should be under the control of a designated lead test team located at the Aviano Primary Master Station. This team will direct each phase of testing and coordinate the testing sequence at each location. It is imperative that each required test action be directed by the lead test team and that all pertinent indications and observations are coordinated and documented before the next action is initiated.

2. Station Indicators

a. Follow the procedure outlined in TABLE 1 and verify correct preliminary equipment indications at each master and remote location.

b. Document correct indications and any valid active fault observed on the appropriate Test Data Form. Master stations (primary) and (slave) will complete TDF 16-05(1) while remote stations will complete 16-05(2).

TABLE I. STATION INDICATORS CHECKOUT

ACTION REQUIRED	INDICATION	COMMENT
1. Observe equipment for indications as shown	Primary Master Station:	
	Decode Lamp Flashing at regular rate (3 to 5 seconds per flash)	
	Station Lamp Flashing sequentially from card to card.	
	ALM/COS Lamp De-energized.	If any ALM/COS lamp is flashing or is energized, depress the MANUAL INTER switch associated with that station card. The indicator should de-energize and remain off. If the indicator stays on, the corresponding site must be contacted to verify the existence of an active fault. An energized indicator with no known active fault is indicative of trouble.
	NO ANS Lamp De-energized.	An energized indicator is indicative of a remote station that is not functioning properly.
	Error Lamp De-energized.	An energized or flashing Error Lamp is indicative of framing or parity errors.

TABLE I. STATION INDICATORS CHECKOUT

ACTION REQUIRED	INDICATION	COMMENT
	CKT PWR Lamp Energized. MAJ Lamp De-energized Alarm Lamps De-energized. Slave/Master Station: Same as Primary Master Station Remote Station: Decode Lamp Periodically flashing (may take as long as 55 seconds between flashes).	If operation is not normal, notify test director and perform basic troubleshooting procedure.
	CKT PWR Lamp Energized Alarm Lamps De-energized	If an alarm is energized, the existence of a corresponding active fault must be verified and documented on the appropriate data sheet.
2. At the first remote station remove power from the FAS equipment.		Removing fuse F2 from the power module effectively removes power from all circuits on that shelf.

TABLE I. STATION INDICATORS CHECKOUT

ACTION REQUIRED	INDICATION	COMMENT
3. At the Primary Master Station depress and mementarily hold the MANUAL INTER switch on the first station card.	Primary Master Station: No ANS Lamp Energized on corresponding station card. Slave/Master Station: NO ANS Lamp De-energized.	
4. At the remote station restore power to the FAS equipment.		
5. At the Primary Master Station depress and hold the MANUAL INTER switch on the first station card.	Primary Master Station: Station Lamp Sequential flashing stopped, indicator remains energized on selected station card. Decode Lamp Flashing NO ANS Lamp De-energized. Error Lamp De-energized ALM/COS Lamp De-energized	Sequential polling stops and selected remote station is immediately polled. An energized or flashing lamp is indicative of framing or parity errors.

TABLE I. STATION INDICATORS CHECKOUT

ACTION REQUIRED	INDICATION	COMMENT
	MAJ Lamp De-energized Alarm Lamp De-energized CKT PWR Lamp Energized Slave/Master Station: Same as Primary Master Station	Assumes no valid faults.
6. At the Primary Master Station release the MANUAL INTER switch.	Primary Master Station: Station Lamp Resumes sequential flashing when MANUAL INTER switch is released Slave/Master Station: Same as Primary Master Station	Polling sequence will resume with the first station card.
7. Repeat steps 2 through 6 for each station card.		
8. Repeat steps 5 through 7 except this time perform required actions at the Slave/Master Stations. Slave stations may be checked simultaneously. (Insure the Slave/Normal switch at the slave stations remains in the slave position).	Primary Master Station: Station Lamp Continues to flash sequentially uneffected by interrogation at the Slave/Master Stations.	

TABLE I. STATION INDICATORS CHECKOUT

ACTION REQUIRED	INDICATION	COMMENT
	Slave/Master Station:	
	Station Lamp Sequential flashing stops and indicator remains energized while MANUAL INTER switch is depressed. Flashing resumes when switch is released.	With the MANUAL INTER switch depressed at the Slave/Master Station, lamps will continue to flash in sequence until the corresponding remote station is polled.
9. Complete appropriate data sheets.		Master stations will complete TDF 16-05(1). Remote stations will complete TDF 16-05(2).

FAS SYSTEM CHECKOUT

TEST ENGINEER _____

WITNESS _____

STATION _____

Master Station Indicators

Table 1, Step 1

Decode Lamp Flashing		ERROR Lamp De-energized	
Station Lamps Flash Sequentially		CKT Lamp Energized	
*ALM/COS Lamps De-energized		*MAJ Lamp De-energized	
NO ANS Lamps De-energized		*ALARM Lamps De-energized	

Table 1, Steps 2 and 3

Station Card Selected

	CLO	MSA	MTC	MCA	MTE	CEG	AVO	VCA	PAG	CIM	ZUG	HST	VHN
Decode Lamp Flashing													
Station Lamp Energized													
*ALM/COS Lamp De-energized													
NO ANS Lamp De-energized													
ERROR Lamp De-energized													
CKT PWR Lamp Energized													
*MAJ Lamp De-energized													
*ALARM Lamps De-energized													

*Verify and document all valid active faults.

TDF 16-05 (2)

FAS SYSTEM CHECKOUT

TEST ENGINEER _____ DATE _____

WITNESS _____

STATION _____

REMOTE STATION INDICATORS

STEP

CRT PWR Lamp Energized	
Decode Lamp Flashing	
*ALARM Lamps De-energized	

*Verify and document all valid active faults.

3. System Alarms

a. Select the first remote station to be tested and follow the guidelines provided in TABLE II to verify correct alarm indications are observed as each applicable alarm input is tested.*

*METHOD: Attach a shorting lead from system ground to the first alarm input (See Data Form 16-05 (3) at the alarm source (radio, TDM, etc.) if possible. If the alarm is not available or is yet to be installed, apply the shorting lead from the system ground to the associated IDF pin (See Table A, Fault Alarm System - DEB Stage I Installation LDBWSO/092AD000).

Each Master Station and the remote station under test will enter observed results on TDF 16-05 (3).

b. Repeat the steps outlined in TABLE II for each remote station to be tested.

c. Transfer control to each master in turn and perform 3(b) for at least one alarm condition per remote station.

4. System Status

a. Select the first remote station to be tested and follow the guidelines provided in TABLE III to verify correct status indications are observed as each applicable status indicator is tested. Each

master station should complete TDF 16-05 (4) as each indicator is tested and determined to function correctly. Note that data sheets are completed only by master stations during this phase of testing.

TABLE II. SYSTEM ALARM CHECKOUT

REQUIRED ACTION	INDICATION	COMMENT
1. At the remote station initiate an alarm condition for the first applicable alarm input. Complete data form as required.	Primary Master Station: Station Lamp When polling sequence reaches the station with the inserted fault, the sequenced flashing stops. Lamp on station card corresponding to remote station with fault is energized. MAJ Lamp De-energized ALM/COS Lamp Flashing on appropriate station card. NO ANS Lamp De-energized Alarm Lamp Applicable lamp energized. All other alarm lamps de-energized. Energized lamp must appear at the proper location.	See data sheets to determine which alarm inputs are used at the station See TDF 16-05 (3) to determine correct location of energized lamp. The first 12-point encoder corresponds to the fourth decode card at the master stations, the second card at the remote corresponds to the fifth decode card at the masters, etc. Any alarm lamps energized other than that intentionally activated must be

TABLE II. SYSTEM ALARM CHECKOUT

REQUIRED ACTION	INDICATION	COMMENT
		checked to be an indication of a valid active fault and documented on the appropriate data sheet.
	Audible Alarm Energized	
	Slave/Master Station	
	Station Lamp Sequenced flashing stopped. Lamp on station card corresponding to remote station energized.	
	MAJ Lamp De-energized	
	ALM/COS Lamp Flashing on appropriate station card.	
	NO ANS Lamp De-energized	
	Remote Station:	
	Alarm Lamp Applicable lamp energized. All other alarm lamps de-energized.	See TDF 16-05(3) to determine correct location of energized lamp.
	Audible Alarm Energized	

TABLE II. SYSTEM ALARM CHECKOUT

REQUIRED ACTION	INDICATION	COMMENT
2. At both master and remote stations depress the audible alarm reset switch on the shift register card.	Audible alarms at both remote and master stations silenced.	
3. At the Primary Master Station mementarily depress the MANUAL INTER switch on the station card with the flashing ALM/COS lamp.	Primary Master Station: ALM/COS Lamp Flashing stopped. Lamp remains energized. Station Lamp Sequential flashing from card to card resumes. Slave/Master Station: ALM/COS Lamp Continues to flash. Station Lamp Sequential flashing from card to card resumes when MANUAL INTER switch at primary master is released. Remote Station: Alarm Lamp Applicable lamp energized.	See TDF 16-05(3) to determine correct location of energized lamp.
4. At the Slave/ Master Stations depress the MANUAL INTER switch and	Primary Master Station: No Change	

TABLE II. SYSTEM ALARM CHECKOUT

REQUIRED ACTION	INDICATION	COMMENT
hold until remote station is polled.		
	Slave/Master Station:	
	ALM/COS Lamp Flashing stopped. Lamp remains energized.	Hold MANUAL INTER switch down until remote station under test is polled.
	Alarm Lamp Applicable lamp energized	See TDF 16-05(3) for correct location of energized lamp.
	Station Lamp Sequential flashing continues and will stop when remote station is polled. When MANUAL INTER switch is released, sequential flashing resumes.	
	Remote Station:	
	No Change	
5. At remote station clear the alarm condition initiated in step 1.	Primary Master Station:	
	ALM/COS Lamp Lamp on station card will begin flashing when the associated remote station is polled during the normal polling sequence.	
	Station Lamp Sequenced flashing stops. Lamp on associated station card	

TABLE II. SYSTEM ALARM CHECKOUT

REQUIRED ACTION	INDICATION	COMMENT
	energized. Alarm Lamp Associated alarm lamp de-energized. Audible Alarm Energized. Slave/Master Station: ALM/COS Lamp Flashing lamp on station card associated with remote station under test. Remote Station: Alarm Lamp De-energized. Audible Alarm Energized.	
6. At both master and remote stations depress the audible alarm reset switch on the shift register card.	Audible alarm at both remote and master stations silenced.	
7. At the Primary Master Station momentarily depress the MANUAL INTER switch on the associated station card.	Primary Master Station: ALM/COS Lamp Flashing stopped. Lamp remains de-energized. Station Lamp Sequential flashing resumes when	

TABLE II. SYSTEM ALARM CHECKOUT

REQUIRED ACTION	INDICATION	COMMENT
	MANUAL INTER switch is released. Slave/Master Station: ALM/COS Lamp Flashing lamp on associated station card. Station Lamp Sequential flashing resumes when MANUAL INTER switch at primary master is released. Remote Station: No change	
8. At the Slave/ Master Stations depress the MANUAL INTER switch on the associated station card and hold until the remote station is polled.	Primary Master Station: No change Slave/Master Station: ALM/COS Lamp Flashing stopped. Lamp remains de-energized. Station Lamp Sequential flashing resumes when MANUAL INTER switch is released. Alarm Lamp Associated alarm lamp de-energized.	

TABLE II. SYSTEM ALARM CHECKOUT

REQUIRED ACTION	INDICATION	COMMENT
	Remote Station: No change	
9. Repeat steps 1 through 8 for each applicable alarm input.		Refer to data sheets to determine which alarm inputs are used at the particular remote station under test.
10. Complete appropriate data sheet.		All stations (master and remote) will complete TDF 16-05(3).

FAS ALARM POINT STATION/SYSTEM TEST 16-05(3A)

MASTER STATION _____ REMOTE STATION:

REMOTE				MSTR		ITEM	APPLICABLE(X)	TEST RESULTS
ALM PT NO.	CARD NO.	PT. NO.	LAMP NO.	CARD NO.	LAMP NO.			
1	7	1	1	9	1	FIRE		
2	7	2	2	9	2	INTRUDER		
3	7	3	3	9	3	HIGH TEMP.		
4	7	4	4	9	4	LOW TEMP.		
5	7	5	5	9	5	TOWER LIGHT		
6	7	6	6	9	6	PRI A.C. FAIL		
7	7	7	7	9	7	GEN #1 FAIL		
8	7	8	8	9	8	GEN #2 FAIL		
9	7	9	9	9	9	PRI RECT OFF		
10	7	10	10	9	10	STBY RECT OFF		
11	7	11	11	9	11	W/G PRESS		
12	7	12	12	9	12	FUEL LOW		
13	8	1	1	10	1	1 A TWT		
14	8	2	2	10	2	1 A TX		
15	8	3	3	10	3	1 A RX		
16	8	4	4	10	4	1 B TWT		
17	8	5	5	10	5	1 B TX		
18	8	6	6	10	6	1 B RX		
19	8	7	7	10	7	1 RSL FADE		
20	8	8	8	10	8	1 PWR SUPPLIES		
21	8	9	9	10	9	1 PHASE LOCK		
22	8	10						
23	8	11						
24	8	12						

TEST ENGINEER _____ DATE _____ WITNESS _____

FAS ALARM POINT STATION/SYSTEM TEST 16-05(3B)

MASTER STATION _____ REMOTE STATION:

REMOTE				MSTR		ITEM	APPLICABLE(X)	TEST RESULTS
ALM PT NO.	CARD NO.	PT. NO.	LAMP NO.	CARD NO.	LAMP NO.			
25	9	1	1	11	1	1 TDM MAJOR		
26	9	2	2	11	2	1 TDM MINOR		
27	9	3	3	11	3	1 TX STBY OPER		
28	9	4	4	11	4	1 RX STBY OPER		
29	9	5	5	11	5	1 NORM T1 FAULT		
30	9	6	6	11	6	1 STBY T1 FAULT		
31	9	7	7	11	7	1 NORM ERRORS		
32	9	8	8	11	8	1 STBY ERRORS		
33	9	9						
34	9	10						
35	9	11						
36	9	12						
37	10	1	1	12	1	2 A TWT		
38	10	2	2	12	2	2 A TX		
39	10	2	3	12	3	2 A RX		
40	10	4	4	12	4	2 B TWT		
41	10	5	5	12	5	2 B TX		
42	10	6	6	12	6	2 B RX		
43	10	7	7	12	7	2 RSL FADE		
44	10	8	8	12	8	2 PWR SUPPLIES		
45	10	9	9	12	9	2 PHASE LOCK		
46	10	10						
47	10	11						
48	10	12						

TEST ENGINEER _____ DATE _____ WITNESS _____

FAS ALARM POINT STATION/SYSTEM TEST 16-05 (3C)

MASTER STATION _____ REMOTE STATION:

REMOTE				MSTR				
ALM PT NO.	CARD NO.	PT. NO.	LAMP NO.	CARD NO.	LAMP NO.	ITEM	APPLICABLE(X)	TEST RESULTS
49	11	1	1	13	1	2 TDM MAJOR		
50	11	2	2	13	2	2 TDM MINOR		
51	11	3	3	13	3	2 TX STBY OPER		
52	11	4	4	13	4	2 RX STBY OPER		
53	11	5	5	13	5	2 NORM T1 FAULT		
54	11	6	6	13	6	2 STBY T1 FAULT		
55	11	7	7	13	7	2 NORM ERRORS		
56	11	8	8	13	8	2 STBY ERRORS		
57	11	9						
58	11	10						
59	11	11						
60	11	12						
61	12	1	1	14	1	3 A TWT		
62	12	2	2	14	2	3 A TX		
63	12	3	3	14	3	3 A RX		
64	12	4	4	14	4	3 B TWT		
65	12	5	5	14	5	3 B TX		
66	12	6	6	14	6	3 B RX		
67	12	7	7	14	7	3 RSL FADE		
68	12	8	8	14	8	3 PWR SUPPLIES		
69	12	9	9	14	9	3 PHASE LOCK		
70	12	10						
71	12	11						
72	12	12						

TEST ENGINEER _____ DATE _____ WITNESS _____

FAS ALARM POINT STATION/SYSTEM TEST 16-05(3D)

MASTER STATION _____ REMOTE STATION:

REMOTE				MSTR		ITEM	APPLICABLE (X)	TEST RESULTS
ALM PT NO.	CARD NO.	PT. NO.	LAMP NO.	CARD NO.	LAMP NO.			
73	13	1	1	15	1	3 TDM MAJOR		
74	13	2	2	15	2	3 TDM MINOR		
75	13	3	3	15	3	3 TX STBY OPER		
76	13	4	4	15	4	3 RX STBY OPER		
77	13	5	5	15	5	3 NORM T1 FAULT		
78	13	6	6	15	6	3 STBY T1 FAULT		
79	13	7	7	15	7	3 NORM ERRORS		
80	13	8	8	15	8	3 STBY ERRORS		
81	13	9						
82	13	10						
83	13	11						
84	13	12						
85	14	1	1	16	1	PCM 1		
86	14	2	2	16	2	PCM 2		
87	14	3	3	16	3	PCM 3		
88	14	4	4	16	4	PCM 4		
89	14	5	5	16	5	PCM 5		
90	14	6	6	16	6	PCM 6		
91	14	7	7	16	7	PCM 7		
92	14	8	8	16	8	PCM 8		
93	14	9	9	16	9	PCM 9		
94	14	10	10	16	10	PCM 10		
95	14	11	11	16	11	PCM 11		
96	14	12	12	16	12	PCM 12		

TEST ENGINEER _____ DATE _____ WITNESS _____

FAS ALARM POINT STATION/SYSTEM TEST 16-05(3E)

MASTER STATION _____ REMOTE STATION:

REMOTE				MSTR		ITEM	APPLICABLE (X)	TEST RESULTS
ALM PT NO.	CARD NO.	PT. NO.	LAMP NO.	CARD NO.	LAMP NO.			
97	15	1	1	17	1	FDM		
98	15	2						
99	15	3						
100	15	4						
101	15	5						
102	15	6						
103	15	7						
104	15	8						
105	15	9						
106	15	10						
107	15	11						
108	15	12						

TEST ENGINEER _____ DATE _____

WITNESS _____

TABLE III. SYSTEM STATUS CHECKOUT

REQUIRED ACTION	INDICATION	COMMENT
1. At the Primary Master Station depress and hold the MANUAL INTER switch on the station card corresponding to the remote station under test.	Primary Master Station: ALM/COS Lamp De-energized Station Lamp Sequential flashing stopped. Lamp on station card energized. MAJ Lamp De-energized. NO ANS Lamp De-energized. Status Lamps Appropriate lamps energized.	The first three decode cards at the master stations are used to monitor 36 of the three 18-point status inputs. See TDF 16-05(4) to determine locations of appropriate lamps. Energized lamps should correspond to equipment status at remote station. Verify at the remote station that the energized lamps displayed at the master station correctly indicate remote status. Refer to individual data sheets to determine which status indicators are used.

TABLE III. SYSTEM STATUS CHECKOUT

REQUIRED ACTION	INDICATION	COMMENT
	Slave/Master Station: ALM/COS Lamp De-energized Station Lamp Sequential flashing stopped when MANUAL INTER switch is held down at primary master. MAJ Lamp De-energized NO ANS Lamp De-energized Status Lamps Appropriate lamps energized Remote Station: See comments	Slave/Master MANUAL INTER switch must be depressed to enable display. To verify the 18-point encoders work at the remote stations, visible indications on the FAS equipment will be observed at the master stations only. Remote stations must check status of monitored equipment.
2. At the Primary Master Station release the MANUAL INTER switch.	Primary and Slave/Master Stations:	

TABLE III. SYSTEM STATUS CHECKOUT

REQUIRED ACTION	INDICATION	COMMENT
	Station Lamp Sequential flashing resumes	
3. At the remote station change the status of the equipment corresponding to the first applicable input of the remote 18-point encoder. (See comments).		For example, at the radio select RX A if not previously selected.
4. At the Primary Master Station depress and hold the MANUAL INTER switch on the corresponding station card.	Indications are the same as in Step 1.	
5. At the Primary Master Station release the MANUAL INTER switch.	Indications are the same as in Step 2.	
6. At the remote station return the equipment changed in Step 3 to its original status, then change the status of the equipment corresponding to the next applicable 18-point encoder input.		In some cases it may not be appropriate to actually change the equipment status. In these cases connect a shorting lead from System GND (2J-21) to the appropriate encoder input to simulate a change in status.
7. Repeat steps 4 through 6 for each appropriate encoder input.		Refer to individual data sheets to determine appropriate 18-point

TABLE III. SYSTEM STATUS CHECKOUT

REQUIRED ACTION	INDICATION	COMMENT
		encoder inputs.
8. Complete appropriate data sheet.		Master stations will complete TDF 16-05(4).

FAS STATUS POINT STATION/SYSTEM TEST 16-05(4A)

MASTER STATION _____ REMOTE STATION:

REMOTE			MSTR				
STATUS PT. NO.	CARD NO.	POINT NO.	CARD NO.	LAMP NO.	ITEM	APPLICABLE (X)	TEST RESULTS
1	4	7	6	1	1 SELECT RX A		
2	4	8	6	2	1 SELECT RX B		
3	4	9	6	3	2 SELECT RX A		
4	4	10	6	4	2 SELECT RX B		
5	4	11	6	5	3 SELECT RX A		
6	4	12	6	6	3 SELECT RX B		
7	4	13	6	7	1 TCVR A DISABLE		
8	4	14	6	8	1 TCVR B DISABLE		
9	4	15	6	9	2 TCVR A DISABLE		
10	4	16	6	10	2 TCVR B DISABLE		
11	4	17	6	11	GEN START		
12	4	18	6	12	TWR LT DISABLE		
13	5	1	7	1	LOAD SHARE		
14	5	2	7	2	FUTURE		
15	5	3	7	3	FAS TEST		
16	5	4					
17	5	5					
18	5	6					
19	5	7					
20	5	8					
21	5	9					
22	5	10					
23	5	11					
24	5	12					

TEST ENGINEER _____ DATE _____ WITNESS _____

FAS STATUS POINT STATION/SYSTEM TEST 16-05(4B)

MASTER STATION _____ REMOTE STATION:

REMOTE			MSTR		ITEM	APPLICABLE (X)	TEST RESULTS
STATUS PT. NO.	CARD NO.	POINT NO.	CARD NO.	LAMP NO.			
25	5	13	8	1	1 RX A OPER		
26	5	14	8	2	1 RX B OPER		
27	5	15	8	3	2 RX A OPER		
28	5	16	8	4	2 RX B OPER		
29	5	17	8	5	3 RX A OPER		
30	5	18	8	6	3 RX B OPER		
31	6	1	8	7	GEN # 1 ON		
32	6	2	8	8	GEN # 2 ON		
33	6	3	8	9	TOWER LT ON		
34	6	4	8	10	PUMP # 1 ON		
35	6	5	8	11	PUMP # 2 ON		
36	6	6					

TEST ENGINEER _____ DATE _____

WITNESS _____

b. Repeat the steps outlined in TABLE III for each remote station to be tested, and complete the Test Data Form.

c. Transfer system control to each slave/master station individually by setting the slave/norm switch on the interface modules to the appropriate positions and repeat steps 4a and 4b for two or three status inputs to be checked. Note this will result in three separate TDF 16-05(4) forms being completed at each master station. This is necessary to evaluate each master station's capability to function in both master and slave modes of operation. (i.e. To function as a passive monitor in the slave mode, and to actively poll and interrogate each remote station in the master mode).

5. Control Functions

a. Select the first remote station to be tested and follow the guidelines provided in TABLE IV to verify correct equipment switching occurs when control functions are executed. Test Data Form 16-05(5) should be completed as each control function is exercised and determined to function correctly.

b. Repeat the steps outlined in TABLE IV for each remote station to be tested, and complete the appropriate Test Data Form.

c. Transfer system control to each slave/master station individually by setting the slave/normal switch to the appropriate position and repeat step 5a using Mt. Cimone as the remote station

under test for the Hohenstadt master, and Cima Gallina as the remote under test for the Coltano Master. Note that slave/master stations will be checked for correct control function operation at only one remote station. Hence only the primary master station will complete TDF 16-05(5) for all stations.

TABLE IV. SYSTEM CONTROL FUNCTION CHECKOUT

REQUIRED ACTION	INDICATION	COMMENT
1. At the Primary Master Station preselect each applicable relay at the remote station under test.	Preselect indicator at the Primary Master energizes as each relay is presented.	Determine applicable relays from individual data sheets for the particular remote station under test. See figure 1 for relay preselect procedure.
2. At the Primary Master Station interrogate each preselected relay.	Preselect indicator illuminates as each relay is interrogated.	See figure 1 for procedure to interrogate relays.
3. At the Primary Master Station clear all relays connected to the first control decoder module by issuing a CMD INT and BRDCAST CLR command. Interrogate each relay connected to the first decode module.	Preselect indicator remains de-energized as each relay is interrogated.	See figure 1 for procedure to clear all relays connected to a common decode module.
4. At the Primary Master Station clear all remaining relays at the remote station by issuing a BRDCAST CLR command and interrogate each relay not checked in Step 3.	Preselect indicator remains de-energized as each relay is interrogated.	See figure 1 for procedure to clear all relays at a station.
5. At the Primary Master Station switch and interrogate each applicable latching relay. Then switch and		

TABLE IV. SYSTEM CONTROL FUNCTION CHECKOUT

REQUIRED ACTION	INDICATION	COMMENT
interrogate each relay again. At the remote station verify corresponding equipment responds to control functions when executed.	At the remote station corresponding equipment should switch when control function is executed. At the master station correct relay status should be displayed when interrogated (i.e. energized when switched the first time and de-energized when switched again). At the master station verify remote station status is displayed correctly by the status indicators.	Latching relays are used with the first 15 control functions. Momentary relays are used for the remaining functions. Determine applicable relays from individual data sheets.
6. At the Primary Master Station switch each applicable momentary relay.	At the remote station, corresponding equipment should switch when control function is executed.	See Step 5 comments.
7. At the Primary Master Station preselect and switch the first applicable relay using the BRDCAST EXEC command.	At the remote station corresponding equipment should switch when control function is executed.	See figure 1 for procedure to issue BRDCAST EXEC command.
8. At the Primary Master Station switch the relay again using the BRDCAST EXEC command.	At the remote station corresponding equipment switches to original status.	
9. Complete appropriate data sheet.		Master and remote stations will complete TDF 16-05 (5)

FAS CONTROL POINT STATION/SYSTEM TEST 16-05(5A)

MASTER STATION _____ REMOTE STATION:

CONTROL CODE	ITEM	APPLICABLE (X)	TEST RESULTS
01	1 SELECT RX A		
02	1 SELECT RX B		
03	2 SELECT RX A		
04	2 SELECT RX B		
05	3 SELECT RX A		
11	3 SELECT RX B		
12	1 TCVR A DISABLE		
13	1 TCVR B DISABLE		
14	2 TCVR A DISABLE		
15	2 TCVR B DISABLE		
21	GEN START		
22	TOWER LT DISABLE		
23	LOAD SHARE		
24	FUTURE		
25	FAS TEST		
31	1 TX NORM - STBY		
32	1 TX STBY - NORM		
33	1 RX NORM - STBY		
34	1 RX STBY - NORM		
35	2 TX NORM - STBY		
36	2 TX STBY - NORM		
37	2 RX NORM - STBY		
38	2 RX STBY - NORM		

TEST ENGINEER _____ DATE _____ WITNESS _____

FAS CONTROL POINT STATION/SYSTEM TEST 16-05(5B)

MASTER STATION _____ REMOTE STATION:

CONTROL CODE	ITEM	APPLICABLE (X)	TEST RESULTS
39	3 TX NORM - STBY		
40	3 TX STBY - NORM		
41	3 RX NORM - STBY		
42	3 RX STBY - NORM		
43	1 SELECT TX A		
44	1 SELECT TX B		
45	2 SELECT TX A		
46	2 SELECT TX B		
47	3 SELECT TX A		
48	3 SELECT TX B		
49	GEN RESET		
50			

TEST ENGINEER _____ DATE _____

WITNESS _____

SWITCH AND CONTROL SETTINGS FOR CONTROL FUNCTIONS

CONTROL FUNCTION	SWITCH AND CONTROL SETTINGS
Relay Preselect	Set Card and Relay Select thumbwheels to relay address. Depress CMD INT and PRESELECT pushbuttons and hold until PRESELECT lamp illuminates.
Relay Interrogate	Set Card and Relay Select thumbwheels to address relay. Depress CMD INT pushbutton and hold until relay status lamp illuminates.
Relay Execute - Single Relay or All Relays Connected to Control Decoder	Set Card and Relay Select thumbwheels to address relay. Depress CMD EXEC pushbutton and hold momentarily. Any preselected relay connected to the same Control Decoder module will also switch.
Relay Execute - All Relays at a Station	Depress BRDCAST EXEC pushbutton and hold momentarily.
Relay Clear - All Relays Connected to One Control Decoder	Set Card Select thumbwheel to address Control Decoder. Depress CMD INT and BRDCAST CLR pushbuttons and hold momentarily.
Relay Clear - All Relays at a Station	Depress BRDCAST CLR pushbutton and hold momentarily.

NOTE: Both thumbwheels set to "0" is invalid address. If latching relays are used, only the Relay Select settings 1 through 5 are valid, since each Control Decoder module controls only 5 latching relays.

FIGURE 1-A

NOTE: In the event of difficulty getting master-initiated control functions to work, remote station should refer to the control function check-out procedure (troubleshooting only). This procedure will serve to check whether control relay interconnect wiring is correct.

APPENDIX B

TP-14-01/16-05

CHECKOUT OF THE FAULT ALARM SYSTEM
REMOTE STATION
(TROUBLESHOOTING ONLY)

Objective

This procedure for the checkout of the DEB I Fault Alarm System (FAS) Remote Station assumes that all the interconnects and wiring from associated equipment are complete.

Specifications

Voltages and alarms must perform as indicated on the attached data forms.

Test Equipment

A.	Multimeter (Simpson 260)	(036)
B.	Test lead 3 feet	(230)
C.	TMS HP 3555A	(024)

Special Considerations

DO NOT PLUG OR UNPLUG PRINTED CIRCUIT BOARD ASSEMBLIES WITH POWER APPLIED TO THE EQUIPMENT SHELF. REMOVING FUSE F2 FROM THE POWER MODULE EFFECTIVELY REMOVES POWER FROM ALL CIRCUITS.

NOTE: All references to -48V (nominal) shall refer to the actual set float voltage which is normally -53.5V.

Reference

Equipment Instruction Manual Pulsecom Datalok 10 Remote

Station Polling System, IN #611.

Procedures

1. Power Module Performance

a. With the Power Module (See Figure 1-B) plugged into the equipment shelf, use the multimeter to verify the output voltage levels on data form 14-1(1).

NOTE: All measurements should be made with respect to system ground (J1-21). There are two grounds on the system--system ground and circuit ground. System ground (J1-21) is station battery ground; circuit ground is 10 volts below system ground. Do not short together! Use the isolation plug.

b. Check for illumination of the CKT PWR lamp on the Power Module and depress the Audible Reset switch on the Shift Register if the audible alarm is energized.

2. Transmitter Level Check and Adjustment:

a. Using a HP 3555 Meter measure the transmitters output level at the drop level jack on the radio miscellaneous bay of FAS 1 TX. It should be -13 dBm $\pm$ 0.5 dBm. If it is out of tolerance, remove power from the FAS and remove the transmitter module. Verify that 13 dB of attenuation is strapped on the board. To place a pad in the circuit, the jumper strap is placed in position 1. To remove a pad, the jumper is placed in position 0. Total attenuation is the sum of the pads strapped in position 1. Reinstall the module

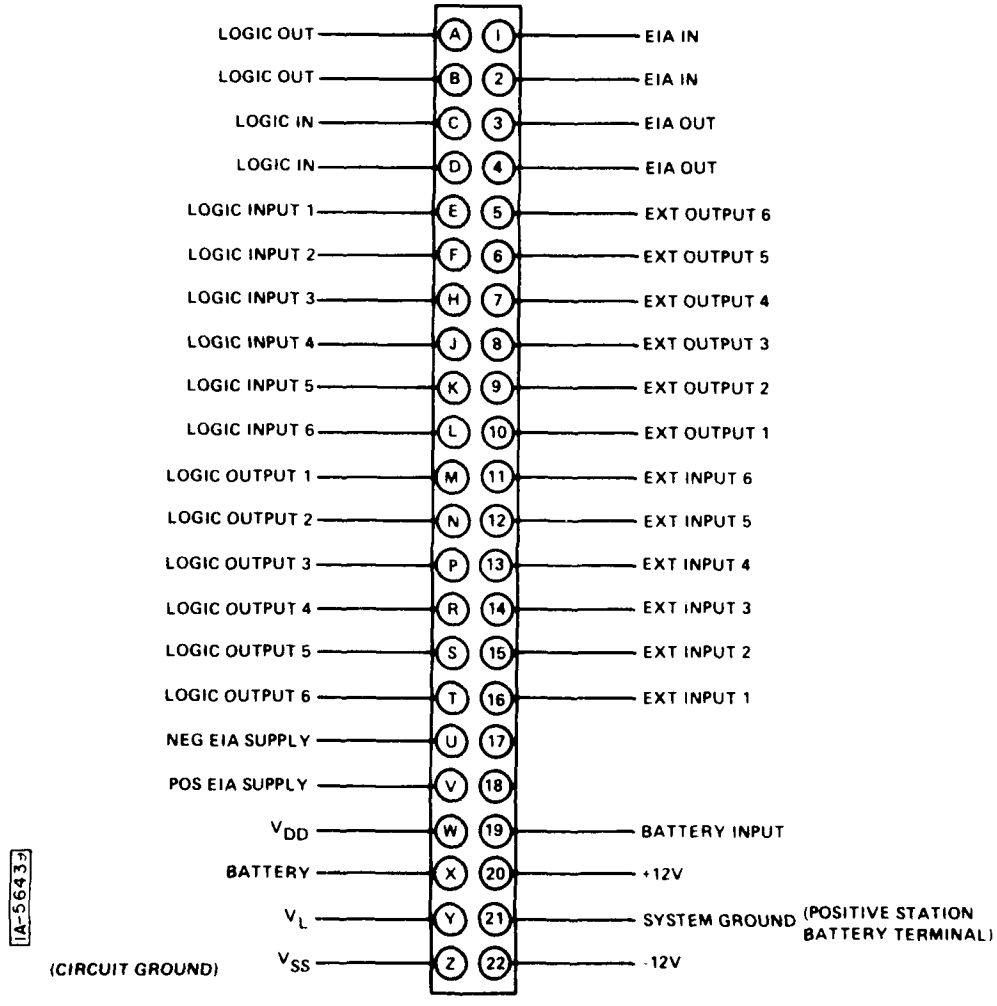

FIGURE 1-B POWER MODULE

CHECKOUT OF THE FAULT ALARM SYSTEM REMOTE STATION

SITE _____ DATE _____

-48 Vdc Supply Battery
Power Module Measurements

STEP 1a

J1 Connector Pin	DC Voltage	Tolerance	Measured Voltage
20	+2 V	±2 V	_____
22	-22 V	±2 V	_____
W	0 V		_____
X	-48 V (5-53.5V)		_____
Y	-4 V	±2 V	_____
Z	-10 V	+1 V	_____

TEST ENGINEER WITNESS

and check again.

3. Receiver Carrier Alarm and Adjustment:

a. Depress the ALARM ADJ pushbutton and turn the ALARM ADJ potentiometer until the CARR ALARM lamp just comes on. Releasing the pushbutton completes the adjustment. The CARR LAMP should de-energize every time a signal is received unless the receive signal carrier drops 12 dBm below the nominal level.

NOTE: Unless the master can poll the remote site, it may not be possible to make this adjustment.

b. The BIAS Adjustment is factory set.

AD-A092 587 MITRE CORP BEDFORD MA F/G 17/2
DEB I FAULT ALARM SYSTEM (FAS) TEST.(U)
OCT 80 H W WALLACE F19628-80-C-0001
UNCLASSIFIED MTR-3879 ESD-TR-80-141 NL

2 OF 2
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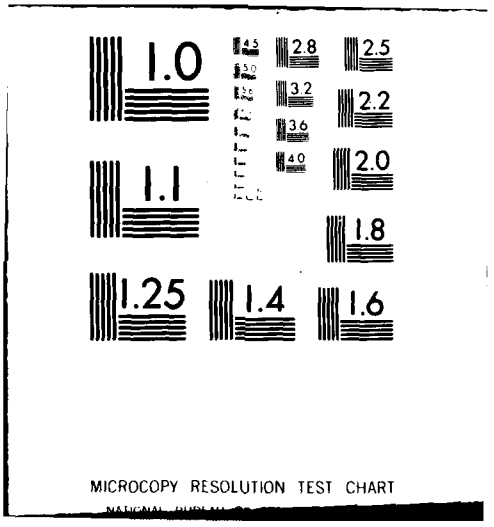
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MICROCOPY RESOLUTION TEST CHART

APPENDIX C

TP-14-01/16-05

FAS CONTROL FUNCTION TROUBLESHOOTING PROCEDURE

Objective

To isolate the source(s) of problems encountered in the testing of the FAS Control Functions.

Test Equipment

a. Test Lead

b. 47 ohm, 1/2 W. resistor

Procedure

This procedure is to be performed only on those circuits which failed to respond as anticipated to commands initiated by the Master Station.

NOTE: In the following procedures observe that system ground must only be momentarily applied to the pins specified. The 47 ohm resister should be used to limit the current through the relay.

A. Latching Relays

The first 15 control functions are operated with latching relays. Relays are energized or de-energized by momentarily connecting a 47 ohm resistor from system ground (pin J1-21) to the proper pin on control Decoder cards (CD5). Data Fm 14-1(3) depicts the pins to be connected to energize and de-energize each relay.

CONTROL FUNCTIONS (LATCHING RELAYS) - DATA SHEET 3

EQUIPMENT	FUNCTION	TO ENERGIZE CONNECTOR	TO ENERGIZE PIN	TO DE-ENERGIZE PIN	ENERG (X)	DE-ENERG (X)	IDF PINS COMM	IDF PINS N.O.	FUNCTION (X)*	STATUS CONNECTOR	STATUS O.K. (X)	
RADIO #1	Select RX A	2J16	3	4			135	134		2J4-7		
"	Select RX B	2J16	5	6			138	137		2J4-8		
RADIO #2	Select RX A	2J16	7	8			141	140		2J4-9		
"	Select RX B	2J16	9	10			144	143		2J4-10		
RADIO #3	Select RX A	2J16	1	2			147	146		2J4-11		
"	Select RX B	2J17	3	4			150	149		2J4-12		
Pwr Control Delay Panel	1 TCVR A Disable	2J17	5	6			153	152		2J4-13		
"	1 TCVR B Disable	2J17	7	8			156	155		2J4-14		
"	2 TCVR A Disable	2J17	9	10			159	158		2J4-15		
"	2 TCVR B Disable	2J17	1	2			162	164		2J4-17		
"	GEN Start	2J18	3	4			165	164		2J4-17		
Twr Lt Control Box	Tower Lt Disable	2J18	5	6			168	167		2J4-18		
Rectifier #1	Select STBY CHG	2J18	7	8			171	170		2J5-1		
" #2	Select PRI CHG	2J18	9	10			174	173		2J5-2		
FAS Shelf #2	FAS TEST	2J18	1	2			177	176		2J5-3		
	*Enter (X) if function operates both energized and de-energized. If function does not exist, check resistance at IDF and enter value.											

1. Energizers. For example, to energize the first relay (Radio #1, select RX A)momentarily touch the 47 ohm resistor to Pin 2J16-3. If the radio set is operational, the "A" receiver should now be on line with the green service lamp of the "A" sensor logic switch on the radio illuminated. Check "ENERG." block on Data Fm 3 if equipment switched.

WARNING

CHECK FOR VOLTAGE BEFORE USING OHMMETER ON IDF.

2. If the function is not installed or not yet connected to the IDF, check the function by measuring at the IDF for a short. IDF pin numbers are shown on Data Fm 14-1(3). Place resistance value in function block.

3. Function Status Line. In all cases, check function status line at pin number indicated on Data Fm 14-1(3). Using the multimeter, measure between the status pin and system ground (should be 0 volts when energized, -48 V when de-energized).

4. De-energize. To de-energize the first relay, momentarily touch the 47 ohm resistor to pin listed in the de-energized column of the data form (2J16-4).

5. Make sure relay is de-energized before proceeding to next relay.

6. Repeat A.1. through A.5. for each control function which failed the system checkout.

B. Momentary Relays. The remaining relays are energized in the same manner but they only remain energized as long as the resistor and wire combination are connected. They do not have a status return signal. Note that TX NORM-STBY and RX NORM-STBY are not wired to the equipment yet. Also the TX STBY-NORM control can't be exercised without a radio link. Verify this wiring by using the ohmmeter between TDM ground and the control wire coming from the FAS to look for contact closure. It should be possible to check RX STBY-NORM if the TDM Receiver Toggle Switch is left in "XFR TO STBY" for a few seconds (See Data Form 14-1(4) for pin locations on control Decoder cards 1J2 and 1J3 used to activate the momentary relays). Complete Data Form 14-1(4).

TABLE 4 CONTROL FUNCTIONS (MOMENTARY RELAYS) - DATA SHEET 4													
		CONNECT MULTIMETER FROM			RESISTANCE READING 0 OHms (X)								
EQUIPMENT	FUNCTION	CONNECTOR - PIN	IDF PIN	TO IDF PIN									
TDM #1	TX NORM-STBY	1J2-4	180	179									
"	TX STBY-NORM	1J-6	183	182									
"	RX NORM-STBY	1J2-8	186	185									
"	RX STBY-NORM	1J2-10	189	188									
TDM #2	TX NORM-STBY	1J2-2	192	191									
"	TX STBY-NORM	1J2-3	195	194									
"	RX NORM-STBY	1J2-5	198	197									
"	RX STBY-NORM	1J2-7	201	200									
TDM #3	TX NORM-STBY	1J2-8	204	203									
"	TX STBY-NORM	1J2-1	207	206									
"	RX NORM-STBY	1J3-4	210	209									
"	RX STBY-NORM	1J3-6	213	212									
RADIO #1	Select TX A	1J3-8	216	215									
"	Select TX B	1J3-10	219	218									
RADIO #2	Select TX A	1J3-2	222	221									
"	Select TX B	1J3-3	225	224									

TABLE 4 CONTROL FUNCTIONS (MOMENTARY RELAYS) - DATA SHEET 4 (CONT)													
		CONNECT MULTIMETER FROM			RESISTANCE READING 0 Ohms (X)								
EQUIPMENT	FUNCTION	CONNECTOR - PIN	IDF PIN TO	IDF PIN									
RADIO #3	Select TX A	1J3-5	228	227									
"	Select TX B	1J3-7	231	230									
Generator	Gen Reset	1J3-9	234	233									
Expansion		1J3-1	237	236									

APPENDIX D

GENERAL PLAN FOR SYSTEM TESTING OF THE FAS

Testing of the FAS on a system-wide basis will begin on 21 August and will continue for an estimated 13 working days. The test will involve a total of approximately 25 participants at the various DEB I sites. Successful completion of the test in a timely manner will be dependent upon achieving a high level of cooperation and coordination between all test participants.

The total effort is divided into four parts:

(1) Verification of station indicators.

(2) Verification of system alarm functions.

(3) Verification of system status indicators.

(4) Verification of system controls.

Station Indicators

The station indicator test will be accomplished first. It will involve personnel at all sites for an estimated period of 1 - 2 hours. At the remote stations it is required only that the status of certain indicator lamps be observed and reported, and that power be removed from the FAS and subsequently restored as directed by personnel at Aviano.

NOTE: THE TEST PROCEDURE CALLS FOR REMOVING POWER FROM THE FAS BY REMOVING FUSE F2. IT IS PREFERABLE, AND RECOMMENDED THAT THE FAS CIRCUIT BREAKER BE USED INSTEAD.

System Alarms & System Status

These 2 parts of the test will be accomplished by test team personnel at the remote stations (with the assistance as necessary of on-site O&M personnel) and by test team personnel at Aviano, Coltano, and Hohenstadt.

The bulk of the interaction will be between the remote station and the Aviano Master. The personnel at Coltano and Hohenstadt will be required primarily as monitors/observers. Their purpose will be to verify that all indications received at Aviano are also received at the slave stations, and that no erroneous indications are received. During these phases of testing it is expected that minimal participation will be required by O&M personnel at sites not directly involved in testing.

System Control Functions

This phase of testing will involve test team personnel at the remote station under test (with the assistance of on-site O&M personnel as required), test team personnel at Aviano, Coltano, and Hohenstadt, and O&M personnel at all sites. The bulk of the interaction will be between the remote station under test and the Aviano Master. The Coltano and Hohenstadt Masters will also be required to exercise their control capabilities, but most of the time they will be monitoring test progress and observing indications received. O&M personnel at the remote stations not under test

will also monitor test progress and observe their equipments to verify that no extraneous control actions take place. Any unexpected occurrences observed at any site should be reported immediately to the test team at Aviano.

Deployment of Test Team Personnel

It is expected that it will take an average of one day to fully check out a remote station for the Alarm, Status and Control functions. In order that the testing be accomplished in as little time as possible, the test personnel will be deployed as follows:

Test Team A

Two persons will be stationed at Coltano for the entire test period. Their task will be to cover the Master at Coltano and the remote at Mt. Serra. Occasional assistance is expected to be provided from on-site O&M personnel to cover the Coltano remote station as necessary.

Test Team B

Two persons will be responsible for covering the following sites in sequence as each site is tested: Aviano, Ceggia, Mt. Venda, Vicenza, Mt. Corna, and Mt. Cimone.

Test Team C

Two persons will be responsible for covering the following sites in sequence as each site is tested: Paganella,

Cima Gallina, Zugspitze, Hohenstadt, and Vaihingen.

Test Team D

This team will be comprised of the Test Director and Sgt. John Hess. They will remain at Aviano during the entire test. They will be controlling test activities and operating the Master Station.

Miscellaneous Test Support

Mr. Don Connor will be at Hohenstadt covering the Master Station. It is expected that on-site O&M personnel will be available to assist as necessary.

Mr. Joe Sciora will be in the area and available for assistance as necessary in correcting order-wire and miscellaneous other problems.

Scheduling

It is expected that it will require approximately one day to fully check out a remote station's alarm, status, and control functions. With this in mind, Test Team B and C will be utilized on an alternate basis so that while Team C is testing, Team B will be travelling to the next site. A tentative schedule is as follows:

Mon. Aug. 20 Teams A, B, & C -- Briefing at Aviano

Team A -- Travel to CLO/MSA

	Team B -- ALM test at AVO
	Team C -- Travel to PAG
Tues. Aug. 21	Station Indicator Test (system-wide)
	Team B -- Status & Control at AVO
Wed. Aug. 22	Team C -- ALM, STAT & CONT at PAG
Thurs. Aug. 23	Team B -- ALM, STAT & CONT at CEG
Fri. Aug. 24	Team C -- ALM, STAT & CONT at CIM
Sat. Aug. 25	Perform residual tests as needed.
Mon. Aug. 27	Team B -- ALM, STAT & CONT at MTE
Tues. Aug. 28	Team C -- ALM, STAT & CONT at ZUG
Wed. Aug. 29	Team B -- ALM, STAT & CONT at VCA
Thurs. Aug. 30	Team C -- ALM, STAT & CONT at HST
Fri. Aug. 31	Team B -- ALM, STAT & CONT at MCA
Sat. Sept. 1	Perform residual tests as needed
Tues. Sept. 4	Team C -- ALM, STAT & CONT at VHN
Wed. Sept. 5	Team B -- ALM, STAT & CONT at MTC
Thurs. Sept 6	Team A -- ALM, STAT & CONT at MSA (augmented by 1 man from Team B)
Fri. Sept 7	Team A -- ALM, STAT & CONT at CLO (augmented by 1 man from Team B)
Sat. Sept. 8	Perform residual tests as needed

APPENDIX E

SAMPLE FAS TEST DATA FORMS

FAS ALARM POINT STATION/SYSTEM TEST 16-05(3A)

MASTER STATION _____ REMOTE STATION: AVIANO

REMOTE				MSTR		ITEM	APPLICABLE (X)	TEST RESULTS
ALM PT NO.	CARD NO.	PT. NO.	LAMP NO.	CARD NO.	LAMP NO.			
1	7	1	1	9	1	Fire		
2	7	2	2	9	2	Intruder		
3	7	3	3	9	3	High Temp.		
4	7	4	4	9	4	Low Temp.		
5	7	5	5	9	5	Tower Light	X	
6	7	6	6	9	6	PRI A.C. Fail		
7	7	7	7	9	7	Gen #1 Fail		
8	7	8	8	9	8	Gen #2 Fail		
9	7	9	9	9	9	PRI Rect Off	X	
10	7	10	10	9	10	Stby Rect Off	X	
11	7	11	11	9	11	W/G Press	X	
12	7	12	12	9	12	Fuel Low		
13	8	1	1	10	1	1 A TWT		
14	8	2	2	10	2	1 A Tx	X	
15	8	3	3	10	3	1 A Rx	X	
16	8	4	4	10	4	1 B TWT		
17	8	5	5	10	5	1 B Tx	X	
18	8	6	6	10	6	1 B Rx	X	
19	8	7	7	10	7	1 RSL Fade	X	
20	8	8	8	10	8	1 PWR Supplies	X	
21	8	9	9	10	9	1 Phase Lock	X	
22	8	10						
23	8	11						
24	8	12						
25	9	1	1	11	1	1 TDM Major	X	
26	9	2	2	11	2	1 TDM Minor	X	
27	9	3	3	11	3	1 Tx Stby Oper	X	
28	9	4	4	11	4	1 Rx Stby Oper	X	
29	9	5	5	11	5	1 Norm Tl Fault	X	
30	9	6	6	11	6	1 Stby Tl Fault	X	
31	9	7	7	11	7	1 Norm Errors	X	
32	9	8	8	11	8	1 Stby Errors	X	

TEST DATA FROM: _____

TEST ENGINEER _____ DATE _____ WITNESS _____

FAS STATUS POINT STATION/SYSTEM TEST 16-05(4a)

MASTER STATION _____ REMOTE STATION: AVIANO

REMOTE			MSTR		ITEM	APPLICABLE (X)	TEST RESULTS
STATUS PT. NO.	CARD NO.	POINT NO.	CARD NO.	LAMP NO.			
1	4	7	6	1	1 Select Rx A	X	
2	4	8	6	2	1 Select Rx B	X	
3	4	9	6	3	2 Select Rx A		
4	4	10	6	4	2 Select Rx B		
5	4	11	6	5	3 Select Rx A		
6	4	12	6	6	3 Select Rx B		
7	4	13	6	7	1 TCVR A Disable		
8	4	14	6	8	1 TCVR B Disable		
9	4	15	6	9	2 TCVR A Disable		
10	4	16	6	10	2 TCVR B Disable		
11	4	17	6	11	Gen. Start		
12	4	18	6	12	Twt Light Disable		
13	5	1	7	1	Load Share	X	
14	5	2	7	2	Future	X	
15	5	3	7	3	FAS Test	X	
16	5	4					
17	5	5					
18	5	6					
19	5	7					
20	5	8					
21	5	9					
22	5	10					
23	5	11					
24	5	12					

TEST DATA FROM: _____

TEST ENGINEER _____ DATE _____ WITNESS _____

FAS CONTROL POINT STATION / SYSTEM TEST 16-05(5a)

MASTER STATION _____ REMOTE STATION: AVIANO

REMOTE		MSTR	ITEM	APPLICABLE (X)	TEST RESULTS (BE SURE RELAY ENERGIZES AND DE-ENERGIZES)
SHELF NO.	PIN NO.	CONTROL CODE			
3A	1 --→ 3	0 1	1 Select Rx A	X	
3A	4 --→ 6	0 2	1 Select Rx B	X	
3A	7 --→ 9	0 3	2 Select Rx A		
3A	10 --→ 12	0 4	2 Select Rx B		
3A	13 --→ 15	0 5	3 Select Rx A		
3A	16 --→ 18	1 1	3 Select Rx B		
3A	19 --→ 21	1 2	1 TCVR A Disable		
3A	22 --→ 24	1 3	1 TCVR B Disable		
3A	25 --→ 27	1 4	2 TCVR A Disable		
3A	28 --→ 30	1 5	2 TCVR B Disable		
3B	1 --→ 3	2 1	Gen. Start		
3B	4 --→ 6	2 2	TWR Lt. Disable		
3B	7 --→ 9	2 3	Load Share	X	
3B	10 --→ 12	2 4	Future	X	
3B	13 --→ 15	2 5	FAS Test	X	
4A	1 --→ 3	3 1	1 Tx Norm - Stby	X	
4A	4 --→ 6	3 2	1 Tx Stby - Norm	X	
4A	7 --→ 9	3 3	1 Rx Norm - Stby	X	
4A	10 --→ 12	3 4	1 Rx Stby - Norm	X	
4A	13 --→ 15	3 5	2 Tx Norm - Stby		
4A	16 --→ 18	3 6	2 Tx Stby - Norm		
4A	19 --→ 21	3 7	2 Rx Norm - Stby		
4A	22 --→ 24	3 8	2 Rx Stby - Norm		
4A	24 --→ 27	3 9	3 Tx Norm - Stby		
4A	28 --→ 30	4 0	3 Tx Stby - Norm		
4B	28 --→ 30	4 1	3 Rx Norm - Stby		
4B	4 --→ 6	4 2	3 Rx Stby - Norm		

TEST DATA FROM: _____

TEST ENGINEER _____ DATE _____ WITNESS _____